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ABSTRACT

School characteristics associated with reading achievement and characteristics of low achievers in reading are examined in separate articles in this report. The first article begins with a review of the literature on school effects, arguing that there are school variables that show consistent associations with achievement, when the structure and function of the school system (rather than simple input/output measures) are considered. Studies of successful reading programs are examined in order to isolate common characteristics. Finally, the literature on educational innovation is extensively reviewed. The second article focuses on research findings distinguishing between good readers and poor readers, in terms of cognitive abilities and other skills related to reading. (AA)

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# A STUDY OF THE LOCUS AND NATURE OF READING PROBLEMS IN THE ELEMENTARY SCHOOL

## FINAL REPORT

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## SECTION I

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# SCHOOL CHARACTERISTICS: QUALITIES OF SCHOOLS THAT ARE ASSOCIATED WITH READING ACHIEVEMENT

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Achievement and Failure in Learning to Read: The Search for Schooling Effects, Program Characteristics and Implementation Strategies

The acquisition and the teaching of reading skills, whether it be for compensatory or regular education, takes place in a highly complex environment. Numerous factors must be taken into consideration if one is to plan for a successful program. By this we mean that the success of a reading program depends upon far more than some narrow view suggesting that a good method for teaching reading is all that is required; a delineation of these complex factors will be explained later in the report.

Confidence in public education has been eroded in recent years by dissemination of findings from reports such as the Coleman, et.al. study. One of the purposes of this section is to discuss the findings of reports critical of the value of public education and to present the more recent evidence derived from a social systems analysis of education which has rediscovered the effects of schooling.

Once having presented evidence that schooling does indeed influence the academic achievements of children enrolled in schools, another purpose of this report is to suggest ways to maximize reading achievement. Consequently there is a section on components of successful reading programs looked at from a macroscopic, systemic view. Finally, a most important issue is addressed in the last section, having to do with problems of transfer of successful programs from one setting to a new setting. This problem of transfer relates to issues of dissemination, communication, and utilization of information to new settings.

Following what Jencks refers to as a period of naive optimism about the possibilities of reforming society through the educational system, the past decade has been marked by an opposing trend: rather than presuming that education will be our salvation, it is suggested that the school is ineffectual, or at the extreme, that it simply processes persons through a series of "rites of passage" without influencing their cognitive abilities. This latter point of view has resulted in the debate over "schooling effects," the technical term for assessing the relationship between educational input and output variables. In this section, the background data which contributed to the belief that schooling makes no difference will first be examined; conceptual and methodological problems with these studies will then be discussed; and lastly, evidence suggestive of re-discovered schooling effects will be presented.

## The background: how we came to believe that schooling makes no difference in achievement

The primary document for the argument that schools do not affect the distribution (variability) of abilities was Equality of Educational

Opportunity, published in 1966 and popularly known as the Coleman report. Although the data and analyses of Coleman, et al., cannot be used to suggest that schooling has no effect on students, the dominant conclusion was clearly that the variability in abilities, or relative positions in the population distribution, is minimally affected by any differences in the ways schools go about their tasks. Specifically, Coleman, et al., found that school-to-school variations in achievement, from whatever source are much smaller than individual variations within the school, at all grade levels, for all racial and ethnic groups (Coleman, 1963). The interpretation placed on this finding is that most of the variation in achievement could not possibly be accounted for by differences between schools, since more than seventy per cent of the variation in achievement of each group is accounted for by differences within the same student body. More fine-grained analysis within Coleman's data showed that these differences in source of variation were already large at grade one, and did not decline significantly through years of schooling; that specific educational variables, e.g. per pupil expenditure, teacher characteristics, and laboratory facilities, had no significant relationship to achievement scores; and that the largest amounts of the variance within the school were explained by "objective family conditions" (comprised most largely by parental education) and "subjective family conditions" (structural integrity of the home, etc.). In short, the school accounts for little of the variation in achievement as compared with socio-economic variables.

Following the publication of Equality of Educational Opportunity, a number of re-analyses of its data were carried out (Mayeske, 1972).

Grant, reviewing this work, noted that in general

> ... family background factors are, if anything, even more strongly related to pupil achievement than Coleman originally asserted. It is the 'human resources' children bring to school rather than the traditionally-defined services provided by the school that most affect pupil achievement.
>
> ... it is highly uncertain at this point what school policies, if any, can compensate for the inequalities in cognitive skills between rich and poor children that are apparent at the time they enter school (Grant, 1972, p. 110).

Contemporaneous with the analysis of the EEOS data, other investigators were also suggesting that schools had little effect on variability in achievement, although the explanations which were offered as to what did influence achievement were diverse. Jensen, for example, suggested that he had found essentially the same pattern of results as had Coleman: achievement level in a school is predictable from a number of demographic characteristics over which the school itself has no control whatsoever.

> In an analysis of relationships between (a) minority enrollment, (b) IQ, and (c) reading scores, on the one hand, and (d) pupil expenditure, (e) teacher salary, (f) pupil/teacher ratios, and (g) number of school administrators, on the other hand, in 191 school systems in California, it was found that the school-related variables have negligible correlations with IQ and reading scores, while percentage of minority enrollment has very high negative correlations with the school's mean IQ and reading level (Jensen, 1974, p. 256).

This evidence, together with his investigations of the "failure" of compensatory educational programs (Jensen, 1969) and group differences in ability measure outcomes (Jensen, 1974), indicates to Jensen a genetic component underlying ability; although education may not be wholly ineffective, it cannot be expected to compensate for genetic inequalities.

A third analysis is that presented by Jencks in Inequality. Jencks suggests that the factors underlying the ability distribution are not as simple as the previous investigators might suggest: a socio-economic explanation will not suffice, as there is almost as much economic inequality among those who score high on standardized tests as in the general population; neither is a genetic account adequate, for as Jencks describes it, inequality is re-created anew in each generation, with eventual inequality in life circumstances being nearly as great among siblings as in the general population (Jencks, 1973). Jencks suggests, in fact, that equalizing a variety of factors associated with achievement would only reduce accounted-for variability by the following amounts (Jencks, 1972). See Table 1. As can be seen from Jencks' summary, then, no single factor is sufficient to explain variations in achievement, but the school, as evaluated in terms of differences in resources and expenditures, is certainly not destined to be the agent of change.

Whether the major factor accounting for variability in achievement, then, is socio-economic background, genetics, or some fortuitous interaction of a number of specified and unspecified factors, it is apparent that the school plays a negligible role in determining or changing the abilities of its students in any of these analyses.

## Methodological and conceptual problems with the "no schooling effects" findings

The question of a proper measure. The most immediate problem which seems to present itself in the studies discussed above is that none seriously suggest that schools have no effect, i.e., that students are no different for having attended, but rather use as a measure of effect the distribution of scores on an ability measure and search for rank-order alterations in these. As Grant points out,

> Coleman's finding that there are few significant associations between measured school resources and pupil achievement has often been grossly misstated as "schools don't matter." This is absurd. Simply because smaller classes do not consistently result in higher achievement scores in algebra does not mean that schools have no effects. On the contrary, it is very unlikely that any child would learn algebra at all outside of schools. Coleman was trying to specify the resources that are effective in reducing inequalities, not (merely) the resources that have some demonstrable effect on children's learning (Grant, 1972, p. 114).

There are severe reservations which must be registered, however, regarding using the ability-test score distribution as a measure of the effects of schooling. As Carver has explicitly noted, ability measures of the sort employed by Coleman are specifically designed to maximize individual differences rather than to assess specific knowledge, i.e., items are included in the test when they meet a criterion of discriminating between groups maximally and not necessarily when they tap a piece of knowledge or skill deemed important educationally (Carver, 1975).

To use a measure of this sort is in fact to have an a priori bias against finding instructional effects, since item content is designed not to be related to specific educational experiences.

In addition to recognizing this bias, however, the more important question which is not addressed in the studies of schooling effects is whether it is legitimate to hold the school somehow responsible for ability test scores. Despite Coleman's argument that ability tests are simply a more reliable substitute for achievement tests, the achievement-aptitude relationship is not so simple, and if there is a meaningful distinction to be made between the two, it seems that it is achievement with which the schools are more concerned. In making a judgement regarding the use of aptitude tests as measures of schooling, evidence of the following sort must be considered:

1) As Carver has analyzed the Coleman data, school-to-school variation in verbal aptitude scores may be small relative to within-school variation, but it is nonetheless from 3 to 6 times the magnitude of the year-to-year gains in reading ability found within the same school. That is, it may make considerably more difference which school a child attends than the fact of his attendance for a year, but both figures are kept artifactually small by the design of tests to maximize student-to-student, extra-instructional differences (Carver, 1975).

2) Jensen suggests that in his own data, there is evidence that fewer individual or group differences emerge in measuring "scholastic achievement" than in measuring intelligence or general ability, which he attributes to the greater specificity to instructional content of the former (Jensen, 1974).

3. At various points in learning and for various tasks, what is described as ability (or verbal ability, or IQ) may or may not be related to achievement. Singer, for example, argues

> ... variability in acquisition of word recognition abilities, such as symbol-sound correspondence decreases at successively higher grade levels, while the range in achievement in word meaning increases throughout the grades. So does the range in mental age and the variability in the IQ's of bright vs. average vs. dull.... Hence, for members of a particular group the correlations between IQ and word recognition abilities such as symbol-sound correspondence decreases while the correlation between IQ and reading comprehension increases. Thus, the paradoxical relationship between IQ and reading hinges on the nature of the reading task, the developmental stage of the reader, and differential changes during the acquisition stage in the variability of components defined as reading (Singer, 1975, p.2).

Beyond Singer's general point that the relationship between ability and achievement is variable, other investigators have specifically suggested contextual constraints on the relationship: when instruction is less than optimal or the task difficult, achievement will appear to be more related to ability than when instruction is of high quality and/or the task is easier (Singer, 1975). Further, the precise nature of this interaction may be in time required to learn (Carroll, 1963) or the differential availability of attentional strategies (Zeaman & House, 1963), rather than "ability" to learn per se.

The logical conclusion of this evidence, then, is that to assess the impact of instruction and hence of what the schools are doing requires developing tests sensitive to educational rather than psychometric criteria (Samuels & Edwall, 1975), suggestive evidence presented above indicates that schooling might then be seen to have greater effects.

The question of a proper unit of analysis. The use of the word "unit" has several senses in the statistical and measurement issues to be considered here, but most simply it refers to the fact that every investigation of schooling effects has made some decisions about the aggregation of variables; our task is to inquire about their appropriateness.

The first of these aggregations is in terms of group definitions. School populations are by no means homogeneous, and in order to determine actual effectiveness of schooling, it may be necessary to break the population into sub-groups which, on either empirical or theoretical grounds, are expected to react differentially to similar inputs. In the Coleman data, for example, there is indirect evidence that the variance associated with schooling was largest within the lowest-achieving minority groups (Coleman, 1963), and there is also some suggestion that variation in school quality may have more effect on young students than on older ones (Jencks, 1973). This may indicate that school factors could have an appreciable effect on low-achieving students early in their school careers, if we could adequately isolate such a group and trace their progress through schools. The more general point, however, is that our knowledge of the relevant variables and interactions affecting schooling is meagre, and lacking such knowledge we have substituted traditional ethnic/racial, social class and age definitions for group classifications, a structuring which may hide as much as it reveals.

Secondly, the statistical unit usually chosen for analysis has been the group mean. As Brown and Saks have cogently argued, however, the school is not analogous to a simple production system such that the mean is not always the most informative measure of output. Specifically, considering the entire array or distribution of outputs for which the school is held responsible and the fact that many inputs of schools are designed to alter the standard deviation of a student characteristic (e.g., range of reading achievement), effectiveness might be more accurately assessed by taking measures of the distribution about the mean as well as averages (Brown & Saks, 1975a). Using such revised criteria, Brown and Saks were able to demonstrate the productivity of school inputs in the Michigan Assessment Survey Program (Brown & Saks, 1975b).

Lastly, there is also a question of aggregation in terms of the structural unit investigated. In the Coleman data, for example, this unit was the individual school; Bidwell and Kasarda argue, however, that

> ... it is entirely possible, however, that the school is not the most appropriate unit for discovering effects of schooling on pupils' achievement... If we view organizational phenomena as means for transforming environmental inputs into outputs, then one principal locus of these phenomena may be the school district rather than the individual school (Bidwell & Kasarda, 1975, pp. 55-70).

The specific arguments for using the school district as a unit will be developed below, but the general point is that using an arbitrary size/organizational unit determines in part the input variables which may legitimately be examined, and thus pre-determines the conclusions.

In all of these respects, then, it should be clear that the "no effects" finding must be qualified by realization of the limitations of choosing particular groupings, a particular distributional moment, and a particular structual/size unit for investigation.

The question of a theoretical framework. The most serious charge to be leveled against the schooling effect studies, however, is that a theory of how the educational system is organized is lacking, meaning that there is no coherent means of defining appropriate input variables or of knowing at what level to look for their effects. (Why, for example, should we assume that money per se will affect mean achievement?) In the absence of any theory about what is likely to influence schooling, the dominant approaches have been either to measure everything in sight and calculate all correlations, or to take a "taxpayer" view, e.g. what things that we buy (libraries, labs, carpeting, etc.) might be important? Coleman, for example, admits that the "school" variables in the EEOS were defined at a fairly gross level, and mostly in physical terms (per pupil expenditures, simple counts of facilities); no attempt was made to assess teacher qualifications or attitudes apart from demographic factors, or school policies beyond simple resources (Grant, 1972). In fact, at the time of the reanalyses of the EEOS data, those few researchers who attempted to salvage a relationship between resources and achievement found the patterns an insoluable maze:

> ...the effects are too complex and subtle for researchers to find any general 'laws' that affect large numbers of schools, or for legislators, school boards and school superintendents to make general policies that will make sense across the board. Additional resources may result

> in higher achievement in some cases, but they may also be followed by a decline in achievement in others. At present, nobody has the slightest idea what differentiates the first set of cases from the second (Education and Inequality, 1970, p. 52).

An approach toward attempting to delineate cases such as these has been developing in recent years, however, known as input-output analysis and based on system theory. Cohn and Millman argue that such an approach, as compared with the previous massive correlational studies, may be analogous to a movie, as compared with a snapshot: the systems approach, by specifying structural components at various levels and the connections between them, attempts to show and account for "flow of energy" rather than taking static views of initial and end states (Cohn & Millman, 1975). It is, for example, the attempt to trace the flow of resources through a school system to indicate what outputs may be expected to result if funds are invested in one area rather than another, or if master's-level teachers are put in programs for accelerated students or those with learning problems (Brown & Saks, 1975). It is specifically in this sort of framework that Bidwell and Kasarda argue that the school district is the appropriate level of analysis for determining input-output relations: only by examining the district can variables such as administrative control, budget allocation by function, special services, curricular specialization, and their interactions with environmental variables be included in the study of how different educational organizations influence achievement (and possibly other) outcomes (Bidwell & Kasarda, 1975).

Specifically, Bidwell and Kasarda postulated a three-level organizational scheme for describing the school system which may be diagrammed as shown in Figure 1. At the first level, there are variables in the school district environment but essentially external to it; these are similar to the traditional socio-economic variables which have been investigated in relation to schooling effects and include size, measured by average daily student attendance; fiscal resources or revenue per student; the percentage of students from families below nationally-defined poverty levels; and education level, defined by percentage of adults in the school district with at least a high school education. It is insufficient, however, to attempt to relate these variables directly to education, for each environmental variable may be related to internal structural differences within the district which mediate the relationship. Specifically, these may include the pupil-teacher ratio, the ratio of administrators to classroom teachers (administrative intensity), the ratio of professional support staff (counselors, school psychologists, etc.) to classroom teachers, and the level of staff qualification, measured by the percentage of the staff holding at least the master's degree. It was hypothesized that these variables may then be related to achievement, which was measured separately for reading and mathematics.

Three interesting findings emerged from following the "paths" of environmental variables through the structure of the district to achievement outcomes in applying the model to data obtained from Colorado districts:

1) Resources are related to higher achievement when they are used to buy more teachers and better qualified teachers;
2) The major effect of most environmental variables could in fact be interpreted in terms of its relative effect on teacher quality, quantity, and direct support services;
3) Size may have mixed effects; it may provide for better staff qualifications and lower administrative intensity,

> which tend to be associated with higher achievement, at least for reading, or it may increase the pupil-teacher ratio, which is associated with lower achievement. (Bidwell, 1975, p. 4)

Bidwell and Kasarda's investigation, then, may be seen as a first step in tracing the complex relationships of variables within the school structure to outcomes; at the least it suggests that "schooling effects" may have been hidden in past investigations by assumptions about simple input-output relations.

A somewhat similar approach has been taken by Wiley and Harnischfeger, who suggest that schooling certainly has effects, but that the research question of interest is the form and extent of that effect (Wiley & Harnischfeger, 1974). Specifically, they suggest that student characteristics and school policies determine, respectively, attendance rates and length of school day and school year; these factors, in turn, combine to produce a mediating variable of exposure to schooling, which may influence achievement. See Figure 2. Applying this model to data from the Detroit sixth-grade sample of the EEOS, Wiley and Harnischfeger found that the actual amount of schooling received in a school year may be as much as 24 per cent greater for some students than for others, and that at this greatest difference in quantity of schooling, the associated gain in reading comprehension is two-thirds greater for the more educated group (Wiley & Harnischfeger, 1974). A further suggestion contained in Wiley and Harnischfeger links this empirical finding to the model of school learning proposed by Carroll, which suggests that learning is a function of the relation between time required to do the task and time allotted (Carroll, 1963); if quantity of time allowed for specific instructional objectives is manipulated, a more fine-grained analysis of achievement should be available.

The general point of both of these investigations, then, is that the inner structure of the organization through which input variables are processed may importantly determine whether and how those inputs are translated to outputs. In short, simply trying to relate input and output variables and ignoring the means of mediation may be too confounded an analysis to gain any insights on how schools affect students.

## Evidence suggestive of a re-discovered schooling effect

With the introduction of the refinements suggested above, more recent studies have indeed made contributions to determining what it is about schools which may influence achievement. Following a brief description of the evidence that attending school itself affects achievement, we shall discuss these studies of specific organizational variables.

Effects of school attendance on achievement. Jencks (1972) suggests that the simplest question to be asked regarding schooling effects is whether attending or not attending school influences test scores. His conclusion is that though the evidence is slight (largely because it must come to us through "natural" experiments), it appears that elementary schooling is quite important to the development of the skills measured on standardized tests, particularly for the most socio-economically deprived children (Jencks, 1973). The evidence for this conclusion includes:

1) During World War II, many elementary schools in Holland were closed; the ability scores of children entering at least one

secondary school after the war dropped about seven points, or one-half standard deviation.

2) Schools in Prince Edward County were closed by the local board of education in the early 1960's to avoid integration; when the schools reopened, black children who had not attended school for several years scored significantly lower than most black children of their age.

3) Test scores in New York City were reported to have declined commensurate with the amount of time out of school following closing for several months in the fall of 1968 due to a teacher's strike.

4) Studies in New York City have indicated that the average child's reading scores improve almost three times as fast during the school year as during the summer. Further, the average black child's scores improved nearly as fast as the average white child's while school was in session, but hardly improved at all during the summer (Jencks, 1973).

Evidence of specific factors related to schooling effects. In addition to the findings of Bidwell and Kasarda (1975) and Wiley and Harnischfeger (1974) discussed above, a number of studies have implicated specific structural variables related to achievement:

1) A study conducted in the Philadelphia schools (Summers & Wolfe, 1975) suggests three important variables related to achievement:

   a) Class size apparently has a complex relation to achievement; students who are below grade level perform (gain) best in classes under size 28, while students in the average range show no differential effects of class size up to 33 pupils/classroom. At all age levels, low-ability students appeared to benefit most from smaller classes.

b) Similarly, smaller schools seemed to be related to higher achievement at the elementary and senior levels, with black elementary students and low-achievement senior high students being most affected.

c) Teacher experience and quality (measured by rating of teachers college attended) were also complexly related to achievement. At the elementary level, more experienced teachers seemed to boost the learning of high-achievement students, but lower achievers appeared to do best with newer teachers. In junior high, experience varied with subject area: all students seemed to benefit from English teachers with more than 10 years experience, but the particularly effective mathematics instructors had 3 to 9 years experience (perhaps due to advancements in the field since the longer-employed teachers were trained). Similarly, the rating of the teacher's undergraduate institution was related to higher achievement of all elementary students, but particularly for low-income students; at higher levels, the school rating was related to achievement only in the social sciences.

Equally notable, however, were the factors which failed to be related to achievement, including general physical facilities, all measured characteristics of administrators (principals), and racial match of students and teachers.

2) Spady (1974) reviews a number of schooling effects studies; among the most interesting to a systems approach are the results of Mollenkopf and Melville's (1956) national study of aptitude and

achievement, and Katzman's (1968) analysis of output functions in the Boston school system. Briefly, Mollenkopf and Melville found that:

> ...With SES and student body indicators controlled, mean student achievement was most consistently associated with small class sizes and low pupil-teacher ratios, library and supply expenditures per student, and numbers of special staff in the school...achievement is highest when expenditure levels are high enough to justify "extras," such as nonteaching specialists, good libraries, and large numbers of teachers. (Spady, 1974, p. 146).

Somewhat similarly, Katzman found reading achievement to be negatively associated with "overcrowding" in the classroom, percentage of teachers with less than 10 years experience, and teacher turnover rate (Spady, 1974). Spady summarizes these and other findings by noting that one of the ways in which expenditures may pay off is by concentrating them relatively more heavily on personnel than on tangible facilities (Spady, 1974).

3) Lastly, Weber (1971) selected four schools in inner-city areas (two in New York, one each in Kansas City and Los Angeles) where all SES indicators would predict low achievement, but which in fact had impressive records in reading achievement; he then attempted to isolate the common characteristics which identified these schools. Although several of Weber's characteristics are other than strictly organizational variables

(and will be discussed in following sections), an important component common to the programs was the employment of additional reading personnel, which in turn may have facilitated individualization and continuous evaluation of pupil progress (Weber, 1971), two other characteristics Weber found in these schools.

These diverse results, it seems, may be summarized with two general statements: first, it is clear that there are variables which influence schooling once we extricate ourselves from looking only at inputs and outputs and begin to examine the structure and functioning of the educational system; and secondly, in the studies reviewed here, there is a very general indication that a key structural variable influencing achievement is the deployment of resources for obtaining quality and quantity personnel, as opposed to better physical facilities in general. This ought to suggest, then, that the focus of attention be shifted to examining at the next level of analysis what it is that teachers do: if they are so important to learning, we now need to explore the variables of teaching/instruction which mediate teachers and achievement.

## Program Characteristics of Successful Reading Programs

The purpose of this section is to describe the characteristics of reading programs which are thought to be outstanding. Reading success depends on numberous variables which interact. To what extent do successful programs share common characteristics? If it is found that the successful programs do, in fact, have numerous shared characteristics, this might suggest ways in which less successful reading programs may be helped.

In order to assess characteristics of exemplary reading programs, it was necessary to identify these programs. Information on successful programs was provided by American Institutes of Research (Bowers, Campeau, Roberts & Oscar, 1974), Weber (1971), New York State Office of Education (1974), The Craft Project (Harris & Serwer, 1966), and RMC Corporation (Tallmadge, 1974).

The above reports, which identified outstanding reading programs, shared a common assumption; namely that a good reading program is more than a method; it is a system with individual elements to which there is an order and interdependence of components contributing to the whole of the system. These components which were examined for overlap among successful programs included needs, objectives, staffing, costs and budget, management, facilities, participant's characteristics, and procedures for evaluation. It is important to keep these components in mind as the programs are discussed, realizing that each program does not excel in all the various components.

## Selection Criteria for Outstanding Reading Programs

In the December 1974 AIR Final Report, it is noted that AIR sent out Program Information Forms (PIFS) to over 1,500 candidates to assess the effectiveness of these programs. It was a nationwide search following a systematic approach of screening based on program description and evaluation information. Screening was done by the Right to Read staff, the Office of Education Dissemination Review Panel (OEDRP) and AIR. Of these 1,500 programs, 27 were recommended for packaging by AIR and were further reviewed by OEDRP. The review panel approved 14 of these programs, and of the 14, Right to Read approved 12 for packaging dissemination.

The selection criteria were that these reading programs be located in the United States, that the program had been in use at least one year and would continue to be in operation for at least two more years, that there was program description and cognitive gain, that the measures used to assess the programs were reliable and valid, that statistical significance was observed in assessing tests and evaluations, and that the components of the program were exportable.

George Weber attempted to isolate factors associated with reading success in ghetto schools. The criterion of success which Weber used was a national grade norm score as a median. In addition, a "successful" school had to meet another test: "that the percentage of gross failures be low." Weber (1971, page 5) wrote, "Typically, inner-city schools not only have a low achievement median, but the number of gross reading failures--children achieving far below national norm levels--is high." The third grade was chosen as the grade to test for success since it was by this grade, that the mechanics of reading should be mastered. To overcome the possibility of bias in testing, Weber administered the tests himself. The test which was used was based on The Basic Test of Reading Comprehension. The test contained words that children would understand

and contained 32 items. The child had to read the sentence and strike out the incorrect word. For example, "Tonight Mary is sick. She has a bad cold. Tomorrow she will stay in bed and not green to school."

In 1973, two New York Elementary schools were studied by the New York State Office of Education Performance Review to determine what specific school factors influenced reading achievement. Schools were chosen for which student populations were comparable in SES, race, and second language difficulty, but with one school having a significantly higher reading achievement than the other. The data for this study was obtained through interview and/or observation with principals, teachers, reading coordinators, and reading specialists. Informal text book reading tests were administered to students in grades 2, 4 and 6 to establish the functional reading levels in the two schools. The tests yielded three measurements for each student--functional reading level, word recognition score, and comprehension score.

The 1964 Craft Project concerned itself with gains in reading achievement, and whether these gains resulted from the type of approach used in readings, or the amount of time spent teaching reading and its supporting activities. A total of 1,141 culturally disadvantaged pupils were drawn randomly from twelve schools located in the black ghetto areas of New York City. The teachers used in the project were preinformed volunteers within the system, and were trained extensively in the specific approaches to be utilized. The approaches compared were the Skills-Centered approach divided into the basal reading and phonovisual categories, and the Language-Experience approach divided into two groups, one with normal use of A-V materials, and another with special and increased use of A-V materials. Pre and post-tests were administered to students, with adjustments on the post-test measures to account for the original differences in individual's readiness.

In the development of the Project Information Packages (PIPS) by the RMC Research Corporation, major selection criteria were: effectiveness, cost, availability, and replicability. The criteria also specified that the projects must have relevance for underachieving low-income children, that there be enough information available to validate and analyze project success, that information of the program be accessible, that the programs conform to OE policy on dissemination, that the starting cost not exceed $1,000 per pupil with recurring costs under $475, and that the program be supported by U.S.O.E. funds and conform to federal regulations.

Approximately 2,000 projects were considered, from which six projects which met all criteria were selected for development into information packages.

The programs selected by these respective criteria will thus constitute the basic data for the analysis of components of successful reading programs.

## Common Factors in Successful Reading Programs

In examining these outstanding reading programs, it becomes apparent that there are similar components included in many of the programs; hopefully, delineating these will lead to a better understanding of techniques and characteristics which can contribute to a successful reading program. In this section, the individual reading programs selected by each of the major studies reviewed here will be closely examined; again, the organization is by report to insure comparability of "success" criteria.

AIR programs. Of the twelve reading programs selected by AIR, the seven which have as their primary concern the initial teaching of reading in elementary school settings will be analyzed. These are:

1. Intensive Reading Improvement Program (IRIP, Chicago): The teacher is considered the key element of this program; resource teachers are provided 60 hours of preservice and inservice training, and classroom teachers, 30 hours. Teachers and consultants write the units used in the program, which are designed to emphasize directed lessons and mastery learning for comprehension, word attach, and phonetic skills, as well as critical and interpretive approaches to reading. A 1972 study conducted in the program showed an average of 9.65 months gain during the 7-month program on the Stanford Early School Achievement and Metropolitan Readiness Achievement Tests.

2. Project Reading (Pittsburgh): Proficiency in reading is deemed by this program to be heavily influenced by decoding skills at the primary level, with increasing emphasis on comprehension and interpretation at older age levels. The program uses programmed readers in individualized instruction, and students are required to attain an 80% mastery criterion in each subsystem of a 500-objective instructional plan, with remediation by unit provided for those not reaching criteria. Thus, diagnosis and assessment is provided continuously in the instructional scheme. Project Read students have been reported to score .4-1.0 standard deviation above matched controls on the Wide Range and Metropolitan reading tests.

3. Title I Reading Center (Browand County, Florida): The focus of this project is to offer remedial instruction to first through sixth

grade students in Title I schools who are approximately two years below grade level in reading. Special instruction is provided for five hours per two week block, with each student working in an individualized program with the help of a team of teachers. The individual programs are sequentially arranged with a mastery requirement for each unit, and ongoing diagnostic testing is considered an important program element.

4. Learning to Read Through the Arts (New York City): An after-school remedial program for fourth through sixth graders, group activities centered around a variety of artistic media teach vocabulary, reading skills, comprehension, and reference skills. The staff, which includes art and reading teachers and a reading specialist, eventually develops an individualized program for each student, commensurate with his/her interests.

5. Individualized Reading System (Andover, Mass.): Individualized programs are provided for students in grades one through six, with basic skills, including phonics, word recognition, and word analysis, emphasized. Pre- and post-test scores are used to determine a student's readiness to begin work on a new unit; completion of units is followed by free reading programs. Teachers are responsible for charting diagnostic status and progress of each student. Program evaluation results have indicated that students in the program show significant improvement in reading comprehension and vocabulary skills.

6. Child-Parent Centers (Chicago): Serving low-income neighborhoods, instruction covers both the pre-school and elementary period on a wide range of language and reading skills. Teachers, aides, and parents are involved in planning individualized programs for children and selecting materials; high mastery standards and social reinforcement are emphasized

in moving children through their plans, and parents attend special classes to learn to foster their children's progress. On nationally-standardized readiness tests, 82 percent of the Center's pre-schoolers are determined "ready" for first grade, as compared with a national level of 69 percent.

7. All-Day Kindergarten (Cincinnati): Children who score below the twenty-fifth percentile on readiness norms (kindergarten level) enter this school, which concentrates on pre-reading skills such as vocabulary development and letter and sound concepts and correspondences, taught through a multi-sensory system. In-service training is provided for all teachers and aides.

Although certain factors have been reiterated repeatedly in describing these programs, we can now ask specifically which components are common to these programs and what their contribution is to the program's success. Previous surveys of compensatory programs evaluated by AIR (Wargo, Tallmadge, Michaels, Lipe & Morris, 1972) suggested that six unique components appeared to account for the common success of a number of programs: 1) academic objectives clearly stated and/or careful planning; 2) teacher training in the methods of the program; 3) small group or individualized instruction; 4) directly relevant instruction; 5) high treatment intensity; and 6) active parental involvement. To these we might add two characteristics which, subjectively at least, appear to be present through a number of the programs reviewed here: the utilization of additional reading personnel (both specialists and classroom aides); and some sort of continuous assessment system, providing both feedback and diagnostic information. Table 2 shows the frequency occurrence of each of these elements in the AIR programs. See Table 2.

The picture which emerges from this plotting of common factors, then, seems to be the following: the successful AIR program is one in which the child receives an individual reading program, usually well-defined in terms of specifically sequenced objectives and emphasizing basic decoding skills, and through which his/her progress in terms of mastery of particular units or objectives is continuously assessed. Additionally, there will be well-trained aides, teachers, and specialists available to help the child, and perhaps parents will also be involved; further, he/she will be spending much time in reading instruction relative to the non-program child, both in whole-class instruction and individually.

Weber (1971, 1974). The four schools in which Weber conducted his study were P.S. #11 and P.S. #129 (John H. Finley) both in Manhattan, New York; Woodland School in Kansas City, Missouri; and the Ann Street School in Los Angeles, California. It is interesting to note that what was considered successful reading achievement of these four inner-city ghetto schools was approximately equivalent to the reading achievement found in the average income schools of the United States. Although Weber acknowledged that non-school factors can contribute to success or failure in beginning reading, he argued that a great difference in reading achievement can result, depending on a school's effectiveness of teaching beginning reading. Weber found that strong leadership, from teachers and other faculty, high expectations for the students, an orderly, pleasant, and happy atmosphere, a strong emphasis on reading, use of additional reading personnel, use of phonics, individualization, and careful evaluation of pupil progress contributed to successful reading programs. Weber believed that the attitude and approaches of the faculty, combined with a purposeful and pleasurable learning environment and a well-structured reading program were responsible for better reading achievement in these four inner city ghetto schools.

Weber did not find that small class size, achievement grouping, quality of teaching (not every teacher need be outstanding), similar ethnic background of the principals, teachers, and students, preschool education, and good physical condition of the school buildings were critical factors that contributed to the success of a reading program. These findings, which are in many ways similar to the AIR results and the formal "schooling" effects studies discussed in chapter 1 of the present report, reinforce the notion then, that personnel and instructional programs are more important to success than sheer amounts of resources.

New York State Office of Education (1974). In the case study of two inner-city schools conducted by the New York State Office of Education Performance Review, statistical analysis showed that at the 4th and 6th grade level one school had higher reading, word recognition, and comprehension levels than a socio-culturally matched comparison school; and it appeared that these differences in student performance could be attributed to factors under the school's control.

Administrative behavior appeared to have significant impact on school effectiveness; the administrative team in the more effective school had developed and implemented plans for dealing with reading programs. Positive correlations were found between ratings of effective administration and pupil achievement; it appeared that administrative behavior and policies directly affected the children's education.

Classroom instruction per se did not appear to differ between the two schools; however, there was better organization of reading time in the more effective school. Personnel in the less effective school tended to attribute reading problems to non-school factors and teachers were pessimistic concerning their own impact on students. Further, in the successful school, teachers were required to understand and use various supplemental and compensatory programs and their activities, whereas in the comparison school, teachers were unfamiliar with these programs and their activities.

In the successful school, a major emphasis was placed on teacher student interaction, use of multi-level and supplementary materials, feedback, positive reinforcement, extensive pupil evaluation and specialized teacher training programs to prepare for and promote positive interaction between teaching staff and administration. The school climate was one of high expectations with a responsive and rewarding atmosphere. According to survey results, one of the major differences between the two schools was that the less successful school lacked planning for the total educational experience of its students; this lack of coordination, reportedly due to administrative failures, was correlated with friction among staff members. In the successful school, there was a school-wide effort to plan the teaching of reading, whereas in the less successful school, it was difficult to find any significant group involvement encouraging reading improvement.

Factors similar to Weber's findings again emerge here: the successful New York school was marked by strong leadership from the administration and teachers, positive expectations for success, extensive pupil evaluation, use of a variety of materials, and special training programs for teachers. Personnel and attitudes seem to be important determiners of success.

Craft Project (1966). Investigation of differences among methods in the Craft Project after one year showed slight but consistent differences in reading achievement favoring a skills-centered approach over a language-experience approach (a finding consonant with the emphasis on decoding, phonics and subskills in other programs); perhaps more informative, however, were time differences in reading instruction for various teachers.

"Total time" for reading instruction can be broken down into "reading time," the amount of time students actually spend in reading, and "supportive time," which includes all of the other activities which might go on during an instructional period related to reading. Results tended to show that when a considerable amount of time was spent on activities that required little or no reading, the effect on reading achievement tended to be unfavorable; "reading time" was positively correlated with reading achievement for all methods, while "supportive" and "total" time were not. It also appeared that instructional time could have a larger effect on achievement than specific instructional method, for when more time was spent in reading activities distinctively characteristic of a particular method, achievement improved. In a manner reminiscent of the Wiley and Harnischfeger results (see chapter 1), then, instructional time may mediate schooling effects; additionally, an approach which emphasizes basic skills again appeared to be supported.

RMC Corporation. At the time of this writing the Stanford Research Institute is processing and evaluating the outcomes of the six programs that were chosen by RMC Research Corporation and tried out by schools in 19 districts during the 1974-75 school year. Whereas these programs appear now to indicate success in reading achievement, it is not yet possible to isolate particular factors associated with achievement gains or other measures of success.

## Summary: What Makes a Successful Reading Program

From the studies which have been investigated, we must now attempt to distill the characteristics which appear to contribute to success in reading programs. To do this requires, however, a realization of the lack of comparability among studies discussed, particularly with regard to the level of aggregation issue: while some have focused on the organizational or structural variables in a program, others have attempted to determine the effects of more specific instructional routines. Hence the tentative proposal offered here for successful reading programs contains these two levels of variables.

At an organizational level, it appears that the evidence converges on a district with successful readers which has strong administrative leadership, cooperation and involvement of staff in planning a coordinated reading program, and an atmosphere of success, rather than failure, expectation. Further, it is quite apparent in these studies that the successful district is one in which fiscal resources are predominantly invested in personnel rather than facilities per se: the successful schools had acceptable pupil-teacher ratios, teacher aides to assist in individualizing instruction, and often a reading specialist or program coordinator.

At an instructional level, the variables emerging may not be as neatly defined as one might wish (it is abundantly clear that no one method of reading instruction is consistently superior), but it may be seen that certain characteristics of instruction are important: the successful programs break the reading task into subskills or units (note also the frequent inclusion of a "phonics" component) which are specifically sequenced; the student moves through these units at an individual pace and must attain mastery of each before moving on to the next. The continuous feedback resulting from such a system further becomes reinforcement for the student and a diagnostic aid for the instructor.

A successful reading program, it thus seems, must include these properties as rudimentary; an administrative concern with reading and a carefully structured program may indeed be the crucial variables in showing that schools do have an effect on the reading achievement of their students.

## An Overview of the Research Literature on Educational Innovation

Introduction. This section is intended as a broad overview of the existing innovation literature and an attempt to analyze, via this literature, the reported failure of federal efforts to promote and achieve consistent innovation in local educational practices. It is based, to a large extent, on data and conclusions collected for the 1974-1975 Rand Corporation study of federal programs supporting educational change. The interpretation and speculations offered in this overview are those of the author and do not necessarily represent the views of the Rand Corporation (Berman, et al., 1974-1975), or its sponsor, the United States Office of Education. There is also a large amount of information drawn from the information collected by the Stanford Research Institute for the Department of Health, Education, and Welfare (Hall and Alford, 1975-1976).

The extent of innovation literature is enormous and rapidly increasing. This section is not meant as an exhaustive study of the entire corpus of change literature, but is based on studies selected to assess the main points of the literature and attempts to draw conclusions from what seem to be the most promising ideas. The tentative conclusions can be outlined as follows:

I. Introduction
II. General Problems of Innovation in Educational Systems
  A. Lack of Knowledge of the School System and its Culture
    1. Organizational Complexity
    2. Problems of Organizational Research in Evaluating Innovational Change

B. Lack of Adequate Criteria and Methodology for Judging Change Efforts
  1. Complications in Innovation Research
    a. Definitional
    b. Mathematical/Methodological
  2. Problems of Data Interpretation
    a. Data and Guideline Inadequacies
    b. Diversity of Goals
    c. Problems of Data Interpretation
C. Impact of Personnel Problems on Innovation Implementation
  1. Structure of the Educational System as a Barrier to Change
  2. Importance of the Classroom Teacher in Innovation
D. Disruptive Patterns in Decision-making
  1. Limited Use of Analysis and Limited Search for Alternatives
  2. Tendency Toward Incremental Change

III. Problems of Innovative Change in the LEA
  A. Scope of Innovative Change
    1. The Viability of Mass Innovation
    2. The Site of Initiating Change
    3. The Method of Introducing the Innovation Into the LEA
  B. The Period of Time in which Change is to Occur
  C. The Number of Alternatives Available for Project Flexibility

IV. Summary

Definition. The 1974-1975 Rand study (Berman, et al., 1974-1975) has proposed a conceptual model of factors affecting change processes in a local educational agency (LEA) and various potentialities of these factors. Although this model will undoubtedly be revised as research proceeds, the critical concepts, propositions and systems of relationships suggested by the model and discussions should help formulate procedures for understanding how the educational system supports, implements, and incorporates innovations (see Figure 3).

The broad objective of the Rand study of change agent programs is to acquire a more systematic understanding of the process of innovation, generally, and specifically to identify the effect of these federal programs on local educational systems.

This section will focus on the problem of innovation using Rand's (Berman, et al., 1974-1975) terminology of support, implementation, and incorporation. For the purposes of this study, the following definitions will be used for the terms:

Support: The support stage includes the concepts of "search," "needs assessment," and "selection." The introduction of an innovative project into a school system or district requires a series of decisions by individual actors within the local policy system to support the proposed project. This concept of support assumes that information on new practices is a necessary, but not a sufficient antecedent to the adoption of a particular innovation. A more important consideration is whether the "time is right" from the perspective of actors within the system or district. Without a high level of institutional support within the system, it is unlikely that the process of innovation will get under way, despite its prima facie merits. The commitments made in the support stage affect what happens when the project begins. The decisions and considerations in this stage are political, not budgetary (Berman, et al., 1974).

Implementation: The change process that occurs when an innovative project impinges upon an organization. This definition shifts the research focus away from measuring compliance or the degree to which the project fulfulls its stated "Goals" to what changes actually occur as a result of the introduction of a new project. The focus also includes how and why changes occur, and how they affect the operation of the organization.

Incorporation: The final phase or stage in innovation. This is the point at which an innovation has been implemented and lost its "special project" status, and becomes part of the routinized behavior of the institutional system. The stage of incorporation (or failure to incorporate) is similar to the initial stage of the innovative process in the sense that support must be generated to institutionalize the project (in whole or in part). Ford (1972) evaluators suggest:

> "Once inertia is reduced so that innovations are implemented, it may be necessary to establish a new stability that permits innovations to be maintained." (p. 87).

This section will contain a section on each of the three stages, a brief overview of the literature pertinent to that stage, a resume of the problems and techniques brought out in the literature, and a brief summary of the section. The section will conclude with a survey of the problems and techniques found in the literature, and a brief conclusion based on the section material. The following outline will be used to summarize the literature review and section contents:

I. Support

  A. Support is a function of:

    1. Federal and State Policy (Provide incentives to support projects)

      a. Type (contents) of policy

      b. Level of funding

      c. Guidelines

      d. Restrictions

      e. Policy comparisons

    2. Community Characteristics (Produce change pressure, constrain possibilities of change, present need to change in characteristics of school population)

      a. Urban-rural composition

      b. Ethnic and racial composition

      c. Community size

      d. Median age of residents

      e. Tax base

      f. Political characteristics

        1) Level of community unrest

        2) Level of community involvement in school affairs

        3) Type of school board

    3. Institutional characteristics (Determine extent to which characteristics have an effect)

      a. Organizational status: Variables

        1) Wealth

        2) Level of per pupil expenditure

  3) Amount of budgetary slack
  4) Pattern of resource use
  5) Size
  6) Age and condition of facilities
  7) Racial and socio-economic-status composition
  8) Pupil per teacher ratio
  9) Staff mobility patterns
  10) Staff age patterns
  11) Number of graduates entering college
  12) Dropout rate

b. Attributes of principle actors
  1) Innovativeness propensity
    $a_1$) The number and rate of widely diffused educational practices in the district
    $b_1$) The nature and number of simultaneous new educational practices in the district
  2) Locus of decision-making (for budget decisions, curriculum, and allocation of resources and personnel)
  3) Research and development capacity
  4) Leadership styles (Authoritarian, democratic, etc.)

c. Organizational capacity to innovate
  1) Perceived educational objectives
  2) Perceived personal consequences
  3) Project techniques and strategy
  4) Perceived institutional effects
    $a_4$) Centrality (Degree of displacement of central and

routinized behavior that might accompany incorporation of an innovative project)

$b_4$) Consonance (The degree of congruence, fit, or compatibility between the perceived goals and practices of an innovative project and pre-existing institutional characteristics)

or: Type of change attempted (Pincus, 1974):

5) Change that increased the level of resource use only

-Change that affects instructional processes or methods without altering the resource level or mix

-Change that affects administrative management without significant alterations of the institutional/organizational power structure

-Change that affects either the organizational structure of the school or the school's relation to external authority

II. Implementation

A. Implementation is a function of relations between:

1. Student outcomes (Project and changes are probably a marginal factor.) Results are also a result of:

a. Student's innate endowments

b. Influence from family, peer group

c. Community

d. Characteristics of school not affected by project (Levin, 1971)

2. Institutional changes

a. Alterations in routinized procedures

      b. Alterations in loci of decision-making
      c. Alterations in roles of individual actors
      d. Creation of specialized and differentiated staff
      e. Degree of centrality
      f. Degree of principal and/or superintendent involvement, support, and accessibility
      g. Degree of reciprocity within schools
      h. Degree of staff participation in decision-making
      i. Teachers' perception of autonomy or activity control
   3. Community characteristics
      a. Attributes which change during the life of the project
      b. Attributes which do not change during the life of the project
      c. Effect of project on the community
         1) Level of community involvement
   4. Project characteristics
      a. Prior planning and testing
      b. Specificity of goals and means
      c. Flexibility
      d. Complexity
      e. Allocation of resources
      f. Staff development

III. Incorporation

A. Incorporation draws on the following factors for evaluation:
   1. The project's actual performance, effects, and history
      a. Evaluation of costs and benefits relative to other

alternatives

2. Incorporation indicators:
   - a. Decision to continue project after federal funds are withdrawn
     - 1) Aspects which are continued
     - 2) To what extent the aspects are continued
   - b. Incremental changes to established routines
   - c. Expansion of existing repertoire by new elements, or
   - d. Replacement of previous institutional patterns of behavior

Summary: the problem of innovation and diffusion

Billions of government dollars, millions of work hours, and numerous good intentions have been spent on the programs of change innovation in the public school system with a result which has been singularly unimpressive. The program of school change has been a problem of epic proportions.

Research on the reported high level of success in innovation case studies reveals that the level is not supported by later research. Gage (1963) found evidence that innovative strategies seldom produce impressive results. J. M. Stephens (1967) also concluded that the new practices produce about as much growth as they replace, but no more (See also Travers, 1973; Averch, et al., 1974).

Federal inquiries were unable to find a consistent or significant effect on student outcomes attributable to federally funded programs (Westinghouse Learning Corp., 1969; Mosbaek, et al., n.d.; US Office of Education, 1970; Wargo, Tallmadge, Michaels, Lipe and Morris, 1972).

If the system governance depends on the capacity to get policies implemented, the balance of power in the educational system resides at its base, the school district. An important consequence of this high degree of centralization, and local autonomy is that the focus of implementation research should be on the school districts and its relations with the schools within its boundaries.

Efforts in the field of education show that federal mandates and policies are not "self-executing." Ratification of legislature concerning local behavior and practice does not always insure that there will be a response within the local education agency (LEA) which is consistent with the original federal intent (Wirt and Kirst, 1972). It is possible that in the brief period of federal attempts to foster innovation and its incorporation in the elementary and secondary systems the "best" policy has not yet been devised (Berman, et al., 1974). Federal efforts to promote innovation in local educational practices has resulted in little consistent or recognizable change or improvement in student outcomes. There are four possible explanations for this.

1) Schools are already having the maximum possible effort
2) Innovations that have been tried thus far are inadequate or underdeveloped
3) Student outcomes have changed, but measurement instruments are inappropriate or insensitive
4) Innovation practices have not been properly implemented

What a school achieves is dependent on the goals which are assumed for education. There are two almost contradictory views: Social equality and the reduction of social inequities.

The social equality view as a goal assumes that any new technological and educational practices can not reduce the inequalities in student background that lead to inequalities in learning and achievement. Those holding this view feel that federal intervention in education is unrealistic and that the money should be invested in alternative social policies. This view is often called "Colemanism" after the disappointing Coleman report (1966) on innovative projects.

Those who assume that education's goal is the reduction of social inequities contend that the present system only perpetuates social differences, therefore, the schools are inefficient. These contend that social equality can only be achieved by revolutionary changes in the present educational system.

The contention that the innovations thus far are inadequate or underdeveloped is an essentially technological view which presupposes that education can be made more effective and efficient. The failure of new practices is interpreted as inadequate technology or underdeveloped practice in its use. This view assumes that there is a rational educational system that is willing and able to change. Shortcomings can be remedied only by an increased R and D (research and development) investment, the funding of local experimental projects, increased flow of information, and increased patience.

The view that student outcomes have changed but that the measurement instruments are inappropriate or insensitive contains two slightly differing views. The first groups, especially educators, contend that change is being made but is not able to be effectively evaluated due to measurement error.

Others argue that change is being made but at a different rate than expected. Because change is occurring in local practices at an incremental rate and accumulating very slowly across the system, the change is overlooked by evaluators. Both variations of this view contend that present evaluations are inaccurate and can not serve as the basis for federal policy. Furthermore, evaluation can not be accurate until more sophisticated measurements and research are developed.

The final view assumes that the educational system is highly resistant to change and to innovation. The problem of proper implementation lies in the bureaucratic nature of the system, not in the plans and projects which can not be implemented according to plan. In their view, innovation in the school system can be changed into "New ways of doing the same thing." This type of misapplication of effort generates much apparent movement in the district, but brings little change in local practice or improved student outcomes.

In order to alleviate the problem, advocates of this view stress the introduction of policies that would require changes in the educational system and in its method of innovation implementation.

With the existence of these varying views, even the problem of assessing problems is a problem. Evaluations are beset with empirical problems and the absence of a systematic theory of planned change. Without a theoretical perspective, federal policy has few reliable guidelines on which to base its policy (Berman, et.al., 1974).

### Support: factors in the support process

The support stage is a function of the initial LEA characteristics, characteristics of the community in which the LEA exists, and of federal and state policy.

Review of support literature. The schools of thought on innovation adoption are roughly divided into two schools of thought: the rationalist-diffusionist (e.g., Havelock, n.d.; Rogers, 1962) and the implementative (e.g., Berman, et al., 1974-1975). The rationalist-diffusionist philosophy assumes that there is a rational model of bureaucratic behavior by which schoolmen look for better educational practices. The diffusion models also assume that the school has some reliable method of identifying adequate procedures and more importantly, are both anxious and able to adopt proved innovations (Berman, et al., 1974). The primary barriers to change are seen as inadequacies in planning, communication, dissemination, and the quality and quantity of available information.

The Rand Corporation study (Berman, et al., 1974-1975) considers the rationalist-diffusionist view of educational innovation unsatisfactory in some important ways:

> The formulation doesn't explain the model process of change. It focuses on adoption, planning and dissemination, while tending to ignore the issue of implementation or institutional adaptation of an innovative strategy. Without that, we can't learn from the success or failure of attempts to innovate; nor do we have a basis for deciding when change has actually occurred (Berman, et al., 1974).

There is extensive literature on the characteristics of adopters. It seems to be the most comprehensive of all literature concerned with educational innovation. The dominant school of thought concentrates on information development and utilization, and tries to formulate and specify management principles that might facilitate the adoption of educational innovations.

Principle characteristics of adopters (Hall and Alford, 1976)

Number: The number of full- and part-time staff available

Personnel Qualifications: The training and previous experience of school personnel involved in the innovation process

Personnel Allocations: The manner in which staff assignments are made (e.g., by region or subject area; in advance or in response to identified needs and interests)

Funding: The level of financial support from the federal government and other sources; funding priorities; allocation of funds over time and across activities/target groups

Timing/Schedule: The pattern of activities over time; the balance of the schedule and its relevance to the school year; the process by which priorities are set and scheduling decisions are made

Internal Evaluation: The degree to which documentation and assessment activities are conducted; goals and purposes of evaluation; types of information collected; impact on subsequent activities

Participant Interactions: The content, type and frequency of interactions; extent to which expectations and role perceptions converge or conflict

Accessibility: The perceived availability for assistance (answering questions; providing materials, providing training, visiting adopter sites or receiving visitors, etc.)

Proximity: The extent to which participants interact primarily with others who are close to them geographically

Credibility: There are three aspects of credibility which are relevant to this study: competence (perceived expertise, reliability of professional credentials;) trustworthiness (perceived sensitivity to needs and interests of others, dependability); and reputation (previous history of success or failure).

Organizational Context: Influence of the organization within which the linker group is located on diffusion activities; ways in which activities are facilitated or hindered

Complexity: The number and functions of separate levels and units included within the institution

Centralization: The extent to which authority rests in a single body; focus of decision-making and identification of any competing groups

Formality: The degree to which activities are governed by rules and specified procedures; scope, activities, and influence of Network steering committee

Compatability: Awareness within the system of alternative diffusion strategies and organizations; interface with alternative efforts

The literature touches on many different adopter characteristics of the administrative and teaching staff related to the adoption of innovation. Another group examines organizational characteristics of school districts since the school district is the most commonly studied unit of adoption. There are also many studies which examine characteristics of the environment in which the school district operates that are related to the adoption of innovation.

A second school of thought on planned change defines the problem of successful innovation in terms of implementation. This variant of an institutional approach is represented by a small number of theorists who have examined the reality of educational innovation from the perspective of an organizational model of institutional behavior. This research has begun to explore the dynamics within the institution and the characteristics of innovative strategies that affect the possibility of planned change (Miles, 1964; Gross, Giaquinta, and Bernstein, 1971; Sarason, Davidson, and Blatt, 1962; Smith and Keith, 1971; Carlson, et al., 1971; Charters, et al., 1973; Berman, et al., 1974-1975).

School district characteristics related to support:

Absence of a Change Agent: The superintendent can fulfill this role to some extent, but his objectivity and effectiveness in its performance are limited; since he is a part of the organization being changed, the changes he advocates or prescribes also include his own practices.

"Domestication" of the Public Schools: Schools are a domesticated organization in that they must offer a service to the public (clients) who by and large must accept the service as offered; this monopolistic relationship tends to produce a stable environment in which the need for and interest in change are restricted.

Goal Ambiguity: School districts have difficulty in specifying goals partially because of the difficulty in measuring the desired output of the education process.

Input Variability: Variability in student and teacher abilities is wide, and thus uniform implementation of innovation is difficult.

Role Performance Invisibility: Teachers in autonomous classroom settings are generally invisible to peers and superiors in the performance of their roles; under these conditions, it is difficult to control for the subversion of innovations.

Low Interdependence: The role performance of one teacher generally has little direct effect on another's performance of his role; since there is little need to work together, the diffusion of innovation is slowed.

Vulnerability: School districts are timid about innovating because they are subject to control, criticism, and a wide variety of legitimate demands from the surrounding environment (Hall and Alford, 1976).

Factors in the support system associated with change: institutional characteristics of the LEA. National traditions of federalism and pluralism protect the local school districts from strong federal and/or state monitoring. Thus, the extent to which local districts use federal funds in accord with federal input depends to a large measure on local interests, incentives and priorities. It is unlikely that even an army of federal auditors could bring about local compliance with federal guidelines if these guidelines or federal objectives conflicted in important ways with local preferences. The practical and political consequences of this balance of power is that the success of federal initiates--be they change agent programs or other federally funded objectives--relies ultimately on the response of the local education agency.

Staff characteristics of the LEA associated with support:

Control Structure: Relationship between those who have input into decisions and those who are affected by the decisions; roles of individual teachers, teacher groups, administrators, etc., in various types of decisions; governance structure

Faculty Interdependence: Provisions for sharing resources and facilities among faculty members; extent to which activities of one faculty member affects others

Departmentalization: Formal or informal organization of the school into separate units (by grade level, subject matter, and so on); autonomy of separate units

Internal Evaluation: Capability for evaluation; kind and frequency of assessment of school programs and activities; impacts of evaluation on subsequent activities

Morale: General feelings of staff members toward their jobs and work environment; sense of security, enthusiasm, prestige, and professionalism (Hall and Alford, 1976)

In an almost tautological sense, all of the various activities and behaviors of individuals participating in a project involve "decisions." Some actions and decisions are particularly significant in that they imply a change in the means or ends of a project (March and Simon, 1958). The decisions of the staff members are crucial not only in the support stage, but throughout the entire life of an innovation. Characteristics of individuals are always, to some extent, a reflection of the setting in which these characteristics are manifested.

Institutional characteristics of the LEA: staff superintendent. At the LEA level, the school districts (as operated by superintendents who are responsible to school boards) handle finances, establish curricula, and allocate personnel, including the hiring, firing, promoting and transferring of administrative staff and teachers.

The staff studies have examined the characteristics of the superintendents who are described as the most important individuals in a school district regarding diffusion of innovation. He is often the only person whose regular activities can readily encompass those of an internal change agent. Superintendent characteristics that are related to innovativeness include a high degree of professional training and an awareness of the existence of potential innovations (Ross, 1958). Innovative superintendents also tend to have a high structural social involvement--as measured by contacts with other superintendents, and high status--as measured by the amount of education and prestige accorded them by other superintendents (Carlson, 1962).

The superintendent, as mentioned above, can fulfill the role of change agent to some extent, but his objectivity and effectiveness in its performance are limited; since he is a part of the institution being changed, the changes he advocates or prescribes also include changes in his own practices (Miles, 1964).

Principal. At the school level, the principal fundamentally affects, and has responsibility for, such system problems as social control, the sequential organization of programs and activities, allocation of staff and resources, and the attainment of goals set largely by other levels of organization. Any proposal for change that intends to alter the quality of life in the school depends primarily on the principal (Sarason, 1969).

The principal also plays an important part as a change agent because of his relationship to the problem and the school. The system puts him in the role of implementing change in his school. He has the power to legislate change, but also has informal and formal restrictions which limit his freedom of action--he does not have complete power within the school (Sarason, 1969).

There are three types of change for him; that which he legislates himself for his own school, that which he legislates by the power given him by the faculty, and that which comes from above and is intended for all schools within the system.

Whether or not he approves of the change, he is largely responsible for implementing it both in fact and in spirit. He is faced with the task of leading the change process to achieve the intended outcomes, i.e., he has to help, and insure that other people (and himself) change. When he feels the change is unfavorable, his dilemma is both increased and decreased. It is increased because he must do something he doesn't approve; decreased because he doesn't feel personally responsible for the change (Sarason, 1969). He is limited by the same factors as the superintendent in his role of change agent.

Teaching staff. Characteristics of the teaching staff have also been widely studied in innovation literature. Usually the characteristics are associated with the teacher's activity and ability levels. These characteristics include the level of education and job satisfaction (Knight and Gorth, 1975), attendance at out-of-town educational meetings (Rogers, 1975), and varied experiences outside of education (Ross, 1958). These characteristics have been found to be correlates of innovativeness among teachers (Ross, 1958):

Innovative Propensity can be Determined By: (Berman, et al., 1974).

- The number and rate of widely diffused educational practices in the district
- The number of simultaneous new educational practices in the district
- The locus (center) of decision-making (for budget decisions, curriculum, and allocation of resources and personnel)
- The research and development capacity within the school and district
- Leadership styles (Authoritarian, democratic, etc.)

Environmental characteristics which affect innovation - sources of innovation. Innovation pressures may be placed from such sources as court decisions, state legislatures or regulative mandates, the influence of industry or special interest groups, and community constitutencies pushing for reform. Subsidy may be made through the forms of additional funding, e.g., federal legislation, or the direct supply of materials and equipment. At the state educational agency (SEA) level, states are legally vested with the authority to provide for education, but state educational agencies exercise their responsibility in very different ways across the states, and influence over local practices is marginal. Problem-solving depends on non-material rewards, such as the improvement of educational programs and even increased prestige through successful innovation (Hall and Alford, 1976). State and federal policies provide various incentives to the local school district to support innovative projects.

Institutional environment: institutional factors which affect support.

Complexity: The size and scope of the district (elementary, secondary, unified); number of separate intra-organizational administrative entities and number of occupational specialities.

Formalization. The number, type and rigidity of rules; degree to which emphasis is placed in following rules and specified procedures in carrying out roles and functions.

Centralization: The degree to which authority rests in a single administrative body; lines of authority; hierarchial structure.

Conflict Resolution/Problem Solving: The capacity for identifying and resolving problems or conflicts; ways in which problems are identified and solutions are developed and implemented; individuals and groups involved in problem-solving.

Leadership: The extent to which the district has exerted a leadership role in the past; locus and roles of opinion leaders (Hall and Alford, 1976).

Education is very dependent on its environment and sensitive to outside pressures, demands and criticisms. Education is an insecure organization, submissive toward its environment, including other social organizations. Its "skin seems extremely thin" (Miles, 1964). The educational system usually follows the lead of the environment; it reacts to environmental demands and stimuli; it does not create them (Elboim-Dror, 1970).

Since local educational systems are accountable to the local and theoretically to the national community, the weights and priorities assigned to various goals at any given time can be expected to change as values and preferences shift in the broader policy setting. Even if a clearly defined set of educational objectives could be specified, it would be risky (and an insurance of obsolescence) to take them as a "given" or a single standard to employ in the construction of theory or in the development of measurement instructions (Berman, et.al., 1974).

The educational system does not necessarily have the selection mechanism assumed by the rationalist-diffusionist perspective. Public schools do not have a market-type selection mechanism, or "profit-maximizing" incentives; the "survival of the institution is guaranteed by society (Berman, et.al., 1974).

The elementary and secondary policy system is a multi-organizational complex composed of:

- A variety of operational units, each having its jurisdictions and responsibilities, both vertically and horizontally
- Operational units tied together by a common institutional framework

Even excluding such ancillary units, groupings and organizations as community groups, graduate and professional schools, technical schools and colleges, professional associations and teachers' unions, the list of operational units is still impressive in number and variety of functions (Berman, et.al., 1974).

The school might properly be called a subculture within the social system (Sarason, 1969). A major characteristic of the American educational system is the high degree of autonomy of each of these "levels" or units of organization (Wayland, 1974).

Because the school system is a hierarchy of autonomous units or levels, innovation is going to mean something different to each of the levels and for different groups in the subculture. There is a series of decisions made along the line which affect more and more differing groups of people on the way downward. The final, and critical group is the students. Students are expected to show certain behavior patterns--patterns which are expected to change over time on a more or less standardized pattern. Any change on the classroom level will change the frequency and pattern of this behavior and with it the responsibility of the teacher (Sarason, 1969).

Social scientists have begun to study the educational system as a complex organization in terms of its bureaucratic structure and the empirical and theoretical characteristics of the informal organization (Janowitz, 1969; Anderson, 1968; Hawley, 1971; Bidwell, 1965; Gross, et al., 1958). The following characteristics have been studied:

- Patterns of authority
- Communications and interactions
- Configurations of goals; beliefs and motivations of individuals in various standardized roles, e.g., teachers, superintendents
- The structure of personal incentives and restraints that motivate individual action and limit behavior

These studies have discovered an underlying similarity among organizations compared laterally, e.g., classroom to classroom. The following similarities exist within the educational organization (Berman, et al., 1974):

- Formal authority relationships within classrooms, etc., are quite similar

- The formal authority links between levels are quite similar
- At corresponding lateral levels, the roles played by individual actors, their incentive structures, and organizational constraints on their behavior are similar
- Organizational ideology (goals and basic beliefs about how schooling should work) is similar throughout the system
- The pressures from various public interests are similar

These organizational similarities seem to suggest that a comparative analysis of innovation may reveal systematic patterns of implementation.

School districts can be timid about innovation because they are subject to a wide range of legitimate demands, control, and criticism from the surrounding environment (Miles, 1964). A school district is a "domesticated" organization that must offer a service to clients who, by and large, must accept the service as offered. This monopolistic relationship tends to produce a stable environment in which the need for, and interest in, change are restricted (Miles, 1964).

Within an LEA there is no clear incentive to innovate, because those institutions that do not innovate aren't likely to "fail" nor to be put out of existence for the failure to bring about needed change. Furthermore, LEA staff members have few incentives to initiate change when outcomes are uncertain and when changing bureaucratic patterns involve personal risk. There is broad agreement that the following characteristics of the educational change process hold, even if they are not consistent with the rationalist-diffusionist view:

- Decisions to adopt or reject an innovation are seldom made on the prima facie merits of the innovation (Miles, 1964; Coleman, 1972;

Rein, 1970)

- The usual process of change is from the top down; pressure for change is typically initiated outside the local school rather than by assessments of school needs (Fullan, 1972; Sarason, 1969; Bennis, Beene, and Chin, 1969; Wirt and Kirst, 1972)

The federal government and federal policy attempt to influence this group of operational units. Federal policy itself is not a single, unified program nor a coherent program administered by a single, dominant agency. It is a composite of funds, guidelines, legal requirements and intents that are the result of political consensus-building between the executive branch and Congress as well as within the Department of Health, Education, and Welfare (Wirt and Kirst, 1972; Berman, et al., 1974).

The Ford Foundation study (1972) found that federal policy exogenously influences the support for an innovation and its incorporation but does not effect the process of implementation.

Institutional characteristics can affect support in a wide variety of ways, and determine the extent to which candidate characteristics have significant effect (Berman, et al., 1974). The variable characteristics are divided into:

- Level of per pupil expenditure
- Community wealth
- Amount of budgetary slack
- Pattern of resource use
- Size
- Age and condition of facilities
- Racial and socio-economic status composition

- Pupil per teacher ratio
- Staff mobility patterns
- Staff age patterns
- Number of graduates entering college
- Dropout rate

Community characteristics which affect support.

Previous Innovation History: The number, type, scope of other innovations previously tried; length of association with other innovations; perceived successes and failures

Community Receptivity: Community-level acceptance/resistance to change and to federal intervention

Fiscal Solvency/Resource Availability: Sources of district income (federal, state, local); per pupil expenditures; availability of resources for innovative efforts

Political Climate: Community image as liberal or conservative; level and nature of controversy over educational issues (busing, teachers' strikes, etc.); history and results of recent elections (school board, bond issues, etc.)

Community Demographics: Size, urbanism, cosmopolitanism, geography, or community

Ethnic/Racial Composition: Of community, staff, and students

The scope of the setting in which a school district operates is also relevant to its behavior in the diffusion of innovation according to comprehensive research conducted by Paul Mort at Columbia University. A major finding of this research was that relationships exist between innovativeness and the financial resources a community makes available to its schools. The finding was replicated many times by Mort and his students (Hall and Alford, 1976).

The Columbia research has been synthesized by Ross (1958). From this, a rather composite picture was compiled of the community characteristics that can help foster school innovativeness. Ross's community is heterogeneous in population, but with a high percentage of citizens employed in white-collar and professional occupations. There is also a high percentage of owner-occupied dwellings. The community additionally has many cultural advantages. Finally, the citizens have a high level of understanding of what the schools can and can not do.

Brickell's studies (1971) have suggested that perhaps it is the relative, not the absolute level of spending that a community makes available that is important. Regardless of its absolute level, if a district's spending is much greater than that of other districts in its geographic area, this difference tends to put the district into leadership in the area. As a leader, it is expected to innovate and tends to fulfill these expectations (Hall and Alford, 1976).

A community's growth record is also important in the innovation pattern (Brickell, 1971). A school district that is increasing in size is much more likely to innovate than one which is decreasing. New schools and school systems with new staff are much more likely to innovate and change since internal patterns have not yet been set.

Summary of support literature. Program and policy literature provides the reader no help in placing the problem of support/innovation in comprehensible and operational terms. It leaves doubt as to whether the problem is due to measurement error, inherent errors in production possibilities, implementation problems, slippage between goals and treatment, or the result of premature assessment.

The literature suggests the difficulties and failures of past practices due to project orientation and theoretical character does not permit generalization from past experience or even specify the nature of the problem in theoretically useful terms (Berman, et al., 1974).

These studies seem to find that the most difficult and complex part of innovation is not pre-adoptive, but post-adoptive behavior, or the process of implementation. In almost all study instances covered, adoption was not at issue; problems of implementation dominated the outcome and success of the innovative projects. Innovations were initiated with a high level of enthusiasm and support by faculty and staff, but the innovation plans failed to achieve their objectives because of unanticipated and often prosaic difficulties and obstacles encountered during the course of implementation (Berman, et al., 1974).

The organizational perspective also contends that "resistance to change" persists after a decision to adopt is made, and continues to exert stresses throughout the process of adaptation and implementation. This model stresses the "dynamic conservatism" of the school system. Thus, the regressive tendency of the system to fall back into pre-existing, or only marginally different patterns of behavior depends on the fundamental character of the organization (Goodlad, Klein and Associates, 1970; Ginsburg, et al., ca. 1970; Coleman, 1972; Charters, et al., 1973; Wargo, et al., 1972; Wirt and Kirst, 1972; Kirst, 1972; Miles, 1964; Berman, et al., 1974).

There is evidence that some programs installed in a school or district have never been actually implemented. Goodlad and his colleagues (1970) found that many schools claiming to have individualized instruction had merely adopted new labels for traditional practices, reported changes were pro forma, and daily activities and behaviors of teachers and others in the school setting remained fundamentally unchanged (See also Mosbaek, et al., n.d.; Wargo, et al., 1972; Heller and Barret, 1970).

It is important to realize that, at least in the context of innovations in education, implementation is an intermediate causal link in the more inclusive process of innovation. Many models of stages of innovation formulated in the literature assume a reality in which rational choices can be made, in which technological innovations can be transferred invariantly from adopter to adopter, and in which change is internally desired and generated.

However, experience suggests that the institutional nature of school districts is quite different. Rather than rational choice, bureaucratic incentives and constraints, and political opportunities and conflicts are the norm; rather than invariant transfer, innovative projects are usually adapted to the local setting; rather than internally generated pressures for change, educational systems typically initiate innovations because of outside forces. This is the reason which impelled Berman, et al. (1974-1975) to use the three-stage model of innovation rather than the five-stage one developed by Rogers (1962) of awareness, interest, evaluation, trial, and adoption (Berman, et al., 1974).

The lack of congruence between rationalistic models of change (e.g., Clark and Guba, 1974; Havelock, n.d.) and other researchers and theorists (see especially Miles, 1964) describe as the dominant problem of innovation, can be largely attributed to their differing intellectual and philosophical traditions. Sarason (1969), Smith and Keith (1971), Charters, et al. (1973), and Gross, et al. (1971) have attempted to structure the problem inductively, the rationalist-diffusionist approach has been largely deductively formulated from management principles to guide innovation. The principles of knowledge utilization and assumptions of diffusion literature have developed a conceptual framework that has only a very general and limited application to educational innovation (see Rogers, 1962; Rogers and Shoemaker, 1971; Havelock, 1969; Berman, et al., 1974-1975).

Diffusion literature draws heavily from the fields of medicine and rural sociology and frames the central problem in terms of adoption and the central issue for analysis as the identification of differential rates of adoption. This view assumes that an innovation is merely a relatively stable "technology" or "product." Once adopted, the product will follow more or less predictable stages of implementation until a decision is made to adopt or terminate. However, there are important practical differences between a "technology" and an educational innovation. The primary barriers to change in the rationalist-diffusionist view are seen as deficiencies in:

- Planning, communication, and dissemination
- The quality and quantity of available information

The differences raise questions about the relevance of rationalist-diffusionist literature and its assumptions for educational innovation

(Berman, et al., 1974).

The principle factors of innovation in rationalist-diffusionist literature are (Hall and Alford, 1976):

Personal Attitudes and Knowledge: The degree of practical or problem-solving orientation of the staff, their knowledge of adopter characteristics, and their attitudes toward linkers and adopters

Personnel Ability: The intelligence and personality characteristics of a staff, and their previous experience and training

Personnel Communication Behavior: External communication with other innovators, with linkers and adopters, and such internal communication factors as openness, cohesiveness, and morale

Personnel Demographics: The socio-economic status, race, and age of a staff

Motivation: The degree to which a staff is motivated by such factors as profit making, status seeking, or merely selfless sharing

Diffusion Capability: The degree to which an innovator organization has also developed a utilization or linkage capability

Research and Evaluation Capability: The degree to which an innovator organization maintains an active program of empirical research

Complexity: The number of separate intra-organizational administrative entities, and the number of occupational specialties and their professionalization

Centralization: The degree to which authority is centered in one administrative entity

Formalization: The degree to which emphasis is placed on following rules and procedures in role performance

External Relationships: Accountability to users or funding sources, and competitiveness with other innovators

Implementation implies an evolutionary character, while sociologists, etc., are more successful in describing stable systems and their mechanisms for resisting change than in explaining how complex organizations change (Stinchcombe, 1965; Huntington, 1971).

Because of the nature of educational innovation, the decision to adopt does not solve the problem of innovation. The adoption decision is only the beginning of a process that exhibits a high degree of instability and variability. Such uncertainty makes it almost inevitable that during its implementation the "plan" becomes developed, operationalized, often revised, and in short, changed to the realities of "successive approximations" of its institutional setting (Barnard, 1938). The volume of case study literature shows that there is evidence that adoption is not a problem (Berman, et al., 1974).

The highly variable and unstable nature of educational innovations implies that it is misleading as well as unfruitful to evaluate the effectiveness of an innovation strategy apart from its institutional setting; and also that both the nature and the outcome of an innovative plan are determined by the complex and little understood process of implementation.

## Implementation

### Factors in the implementation process

The implementation of an innovation is a function of the relations between student outcomes, institutional characteristics, and community characteristics.

Review of implementation literature. Unfortunately, there is no theory or analytical understanding of implementation in the educational, or any other literature (Pressman and Wildavsky, 1973). The characteristics of innovation have received extensive attention in research literature and it is often difficult to distinguish between the discussion of support (adoption) and implementation--most authors tend to draw no distinctions and to treat the two concepts as one. Much of the literature appears to focus on the product of innovation rather than the process--the process is what is proposed here as implementation. There has been extensive discussion on the characteristics of innovation, but little on the processes by which it is originated, implemented, and developed.

Project characteristics related to successful implementation. A number of researchers have attempted to compile comprehensive listings of innovation characteristics, whether they treat innovation as a product or a process. Rogers and Shoemaker (1971) have proposed what is probably the most popular typology to date. The following characteristics are included in their listing: relative advantage, compatability, complexity, trialability, and observability in order to successfully innovate. Zaltman, et al., (1973) list 27 separate characteristics; among them are: degree of commitment, gateway capacity, and impact on interpersonal relationships. There is also an alternative categorization based on a survey of 250 local administrators, teachers, and state department of education officials in two states (Hull and Kester, 1974). This survey produced six major categories of innovation characteristics: student concern orientation, additional resource requirement, intrinsic values, consumer report, credibility, and operational implementation. Fullan and Pomfert (1975) after a review of 37 empirical studies of innovation implementation concluded that there were only two critical characteristics of innovation implementation: explicitness and complexity

The most frequently used variables are: (Hall and Alford, 1976)

Novelty: The absolute and relative degrees to which an innovation is new and different rather than a minor variation of existing practices

Compatability: Consistency or continuity of the innovation with prevailing contemporary lay and professional assumptions, priorities, role definitions, etc.

Relevance: The extent to which the relationship of the innovation to student benefits is perceived as direct, apparent, and so on (a major component of "relative advantage" concept developed by Rogers and Shoemaker (1971) and used widely in the research literature)

Acceptability: The extent to which the innovation is likely to arouse resistance from teachers, administrators, community; extent to which aspects of the innovation are considered controversial

Complexity: Scope/comprehensiveness of the innovation; extent to which it requires numerous changes and affects multiple curriculum areas or functions of the school

Nature: Content or subject matter of the innovation

Target Group/Purpose: Intended target group and goal (e.g., to "close gaps" between low-achieving students and their peers; to maximize individual growth)

Cost: Absolute and relative expenditures of time, money, and energy required; typically, costs associated with start-up or original installation and with continued operation of the innovation are both considered

Concreteness/Salience: Visibility, tangibility of the innovation; degree to which it is based on materials, technology, and physical objects rather than ideas or concepts

Centrality: Extent to which the innovation affects major functions of the adopting institution rather than peripheral areas

Locus of implementation: Level at which the innovation is installed and operated (classroom, school, or district); extent to which adoption/implementation require collaboration and cooperation (that is, the innovation can not be adopted and operated by a single, autonomous individual)

Completeness: Degree to which an innovation is a complete entity, requiring no additional components for implementation

Discreteness: Degree to which the innovation operates in the classroom/school/district; extent to which it constitutes an "add-on" rather than a change in the overall operating system

Interdependence/Divisibility: Degree to which components of an innovation can function independently; extent to which changes in one aspect will affect other aspects

Integrity/Adaptability: Degree to which an innovation can be modified without losing its essential character (includes flexibility of content, target group, locus of implementation, etc.)

Time Frame/Phasing: Length of time required for trial, implementation, refinement, incorporation, and detection of results; incorporates the notion of "trialability" (feasibility of implementation on a limited basis before a full commitment)

Popularity: Popular image of the innovation type; extent to which innovation reflects currently popular ideas, practices, materials, etc.

Repute: Reputation and credibility of the innovation, based on claims of success from developers, early adopters, etc.

This literature tends to emphasize the innovation characteristics of complexity, disruptiveness (degree to which an innovation "disrupts" the classroom schedule, etc.) and related dimensions.

Perceived educational consequences of implementation. Brickell (1971) tried to distinguish some of the aspects of "disruptiveness" in a review. The main factor was that of the magnitude (scope) of the innovation. Those innovations which require large outlays of money, energy, time, or retraining are less likely to be adopted and implemented than those requiring less. Brickell (1971) also cited the extent to which an innovation requires changing a large part of the curriculum or has an effect on programs not directly involved in the change as relevant to the acceptance of innovation. According to this literature, mostly a series of case studies, innovations not requiring unfamiliar or disruptive media or methods are the most easily accepted by the schools (Turnbull, Thorn, and Hutchins, 1974).

Trialability (feasibility or implementation on a limited basis before a full commitment) has been cited in the general diffusion research literature as an important dimension of innovation. There is some evidence that this dimension may not be important in the field of educational innovation, however, as one study has shown that schools tend to adopt innovations without a trial period (Wolf, Jr., 1973). Completeness (degree to which an innovation is a complete entity, requiring no additional components for implementation) is another characteristic examined (Brickell, 1971). If an innovation has built-in implementation supports such as staff training components, implementation is accelerated.

Perceived educational objectives in implementation. The compatability of an innovation with existing role definitions is another feature in the acceptance of innovation. If the innovation reduces the teacher's function to that of a monitor rather than allowing active instruction, it is less likely to be adopted (Bennis, et al., 1969). In addition, the acceptability of an innovation to a teaching staff depends on whether the staff sees the change as a reduction or an increase in existing burdens.

Some innovation-dimension characteristics are so closely related that they are usually discussed together (or as one) in research literature. Divisibility (degree to which components of an innovation can function independently) and adaptability (degree to which an innovation can be modified without losing its essential character) are an example. It has been found that if an innovation is divisible and flexible enough to be adopted on a partial basis or modified to fit local conditions, then diffusion is facilitated (Miles, 1964). Modifications must be left to the adopter's judgement, however; adaptations dictated by an external source can complicate implementation in a school system that is geared toward routinization and regularity (Hall and Alford, 1976).

There are other closely related characteristics such as communicability and concreteness (degree to which an innovation is based on material objects rather than concepts or ideas). Innovations involving technology or concrete materials are easier to implement and diffuse than those involving concepts, perhaps because they are easier to convey information about (Miles, 1964). These materials can be readily redistributed and altered to fit particular situations, while still retaining their basic integrity.

Other studies have supported the findings that less disruptive innovations are more likely to be adopted (Bennis, et al., 1969; Miller, 1974; Widmer, 1975). One major study surveyed the innovations adopted by schools and found that only those that were inexpensive and tended to improve or extend current practice rather than introduce a new one were more likely to be successful (Wolf, Jr., 1973). Innovations that require more than minimal alteration of programs are not likely even to be attempted. One fact that becomes evident in all these findings is that an innovation is acceptable to the extent that it is technically no innovation at all. Educators seem to prefer to continue, or change only moderately, current activities rather than to initiate new ones.

One final school district characteristic given prominence in the research literature is the degree of contact with educational agencies outside the district. A number of studies have found a relationship between extensive external contact and innovative behavior in a school district (Tempkin & Brown, 1974; Johnson and Marcum, 1969; Crandall, 1972).

Few formal links exist between school districts. School districts with viable linking mechanisms to environments relevant to innovation (such as universities) tend to adopt and implement more innovations than those without such mechanisms (Balderidge & Johnson, 1974). One reason for this relationship is that contact with other systems with relevant knowledge and experience saves a district from mistakes and wasted effort (Havelock, et al., 1974).

Perceived institutional effects on implementation; institutional variables affecting implementation. The following group of variables is frequently mentioned in research literature as relating to institutional support for implementation. These are considered "adoption risk" variables and pertain to the receptivity of adopting units toward the innovations and the external agents who provide support for adoption and implementation (Hall and Alford, 1976):

Innovation Sanctions: The extent to which educators are rewarded or sanctioned for trying new ideas and programs; criteria for professional advancement; incentives provided for professional development

Extent of Current Diffusion of Innovations: The number, type, and scope of other federal, state, and local programs currently operating or being considered for adoption

District Support/Backing: The level of awareness, interest, commitment (of staff time, money, resources, and facilities), and participation of superintendent and central office in innovation and change

School Board Support/Backing: Awareness of and interest in innovations; level of awareness, interest, commitment of school board

Professional Association Support/Backing: Awareness of and interest in innovations; extent to which innovation is consistent with or competes with association programs and priorities

Principal and School Staff Support/Receptivity: Extent to which innovation is perceived as relevant, useful, and feasible by the principal, participating teachers, and other teachers; type and extent of support for the innovation provided by the principal

Perception of Innovator Credibility: Perceived expertise and dependability of the developer

Adopter/Innovator Rapport: Cordiality and congeniality between innovator and adopter; perceived similarities in interests, orientation, goals, and personality

Perception of Linker Credibility: Perceived expertise and dependability of the linker or facilitator

Adopter/Linker Rapport: Cordiality and congeniality between linker and adopter; perceived similarities in interests, orientation, goals, and personality

Because both the product and the institutional setting adapt to each other, an implementation theory would have to go beyond project details and incorporate characteristics of the organizational structure as well (Berman, et al., 1975). In any event, the implementation process requires an understanding of the organization itself.

The changes envisioned by most projects are evolutionary changes in existing stable systems. The change is often small and undramatic--modifications which appear beneath scrutiny.

Organizational complexity is cited in the literature as both a hindrance and a promoter of innovation. Balderidge (1974) found evidence that structurally complex and large organizations were more innovative, and concluded that structural complexity in schools should be increased to make them more receptive to change. Zaltman, et al., (1973) found that although complexity seems to favor innovation acceptance, more complex organizations have less success implementing change; complexity favors the entrance of change and innovation, but retards effective cooperation in its implementation. Brickell (1971) concluded that middle ranges of complexity and size in school districts are most conducive to innovation, because small districts can not spare the resources, and large districts have cumbersome bureaucracies.

A dimension closely related to organizational complexity is that of centralization (the distribution of authority in an organization). Authority and power can either be dispersed in a school organization or district (because of such factors as powerful teachers' unions and organized community groups) or highly concentrated in the district administration. Wide distribution and dispersal of authority usually hinders innovation because competing groups have difficulty in reaching agreement; centralized authority can promote innovational efficiency (Fullan and Pomfert, 1975; Bentzen, 1974).

Among the institutional characteristics (in addition to those previously mentioned) that might affect implementation are (Berman, et al., 1974):

- Degree of principal and/or superintendent involvement, support, and accessibility
- Degree of reciprocity (communication between adopter and linker/staff) within schools
- Degree of staff participation in decision-making
- Teachers' perception of autonomy or activity control

Perceived personal consequences on implementation; attributes of personnel within the organizations. The following personal variables emerge from the literature as important for further study:

Locus of Control: Sense of self-control (internal control) versus belief in fate control (external control)

Demographics of Personnel Age, academic background, teaching experience; length of association with current school/assignment; personnel turnover rates

Faculty Rapport: Cordiality and congeniality within the teaching staff; acceptance of colleagues; internal sense of consensus; absence of cliques

Faculty/Administration Rapport: Cordiality and congeniality between teachers and administration; formal and informal relationships; extent to which principals and other administrators are perceived as supportive, sensitive to teachers' needs, interests, and talents; type and frequency of teacher/principal interactions

Faculty/Student Rapport: Relationships and communication patterns between teachers and students

The initial project itself is a plan consisting of a statement of goals and means usually justified in terms of the needs of its target group. In addition, the innovative project implies personal consequences for individual actors that affect their willingness to support the project (Berman, et al., 1975). The history of the change process may be viewed as a series of decisions that increasingly affect or involve more and more groups in an institutional setting (Sarason, 1969). It does not have the same significance for all the different groups in the setting. Some will feel obliged to obstruct, divert, or defeat the proposed change.

Characteristics of the organization might change as a result of the innovative project. The implementation phase is reflected by the various relationships between changing student outcomes, institutional changes, and project changes. These changes may be those anticipated by the initial project plans or unanticipated consequences of implementation. If a theory of implementation is formulated, it would have to explain how, and under what circumstances the series of problem-solving decisions accumulates to produce any type of change.

Significant organizational changes may occur if there are alterations in routinized procedures, the loci of decision-making, roles of individual actors, and in the creation of specialized and differentiated staff. Direct or proxy measures of these institutional effects might be useful.

> "Initiation and innovation are present when change requires the devising and evaluation of new performance programs that have not previously been a part of the organization's repertory and cannot be introduced by a simple application of programmed switching rules." (March and Simon, 1958).

Implementation, in its dictionary sense implies an administrative meaning--to carry out an order or directive. Implementation then, seems to be the problem of obtaining compliance with a command or a set of research procedures in an organization. Research would then involve focusing on why an order is not "obeyed." This orientation initially seems to have some value, but the complex policy system of the American public school system makes this approach difficult. Any member of the organization is reacting to a variety of stimuli and incentives.

Other important incentives for individuals in the adoption process are morale and the locus of control. There are three basic types of incentives on the organizational level: pressure or coercion, additional subsidy, and problem-solving (Pincus, 1974; Brickell, 1971).

Locus of control has been studied in conjunction with the sense of influence which a school staff feels over school concerns (Emrick and Peterson, 1975). There are two types of control continuums for staff members: internal and external. Internal control is based on the individual's assumption that his action is not futile and that one has some control over his environment and destiny. External control is associated with a feeling that events are controlled by some external force

(Sarason, 1969). School staffs with a high sense of internal control and low sense of external control tend to be more successful in implementing innovations.

Usually closely related to the problem of centralization is the dimension of formalization, defined as the emphasis placed on following specific rules and procedures. It has been suggested that low formalization tends to facilitate earlier plans and phases of the adoption process, but hinders the later phase of implementation (Zaltman, et.al, 1973).

Other researchers have examined the problems of heavy dependence on authority. One common pattern is that the change is not sustained over time, or is in some way sabotaged by those forced into participation (Turnbull, et.al., 1974; Hall and Rutherford, 1975; Zaltman, Duncan & Holbeck, 1972). In view of such problems, many reservations have been held by researchers in concluding that significant educational planning and decision-making must be a collaborative effort with all major school system constituencies participating (Sikorski, 1975).

A significant staff characteristic closely related to successful implementation of innovation is morale (Berman, et.al., 1975). Morale is usually defined in terms of staff communications patterns. Goodlad and his associates (Bentzen, 1974) have studied staff communication as a critical factor in self-renewal. Self-renewal is an internal school process in which school problems are identified; it is a necessary prelude to the search for innovative solutions to problems. The self-renewal process is generated by such communication factors as the degree to which principals and teachers agree on school issues, widespread participation in school decisions is encouraged, and a widespread sense of influence over school concerns is present among a staff (Hall and Alford, 1976).

Other attributes of personnel located within the organizations are also based on communication: faculty rapport, faculty-administration rapport, and faculty-student rapport. All these depend on the degree of cordiality and congeniality between the different groups. This type of communication is perhaps typified in the concept of Low Interdependence (Miles, 1965), where the role performance of one teacher generally has little direct effect on another's performance of his role; since there is little need to work together, the diffusion of innovation is slowed. Teachers have little interpersonal contact with each other and very little with the principal and others in administrative positions (Sarason, 1969).

The problem of Low Interdependence is closely related to another concept, Role Performance Invisibility (Miles, 1965). In some crucial ways, the teacher is alone in the classroom and the delivery of his services rests on how well he teaches. Teachers in autonomous classrooms are generally invisible to their peers and superiors in the performance of their roles. Under these circumstances, it is difficult to control for the subversion of innovations. The autonomy of the classroom is also the setting for Input Variability--the variability in student and teacher abilities is wide, and uniform measurement is difficult.

Project techniques and strategy to facilitate implementation. Another district characteristic cited in the literature as important for implementation is the capability for planning and leadership. Districts which have an adequately developed planning capability have been found to continue the use of innovations longer than districts without it (Miller, 1974; Widmer, 1975). The existence of a planning and leadership capability has also been related to the number of positive innovations in the districts (Havelock, et al., 1974) and to the effectiveness of curriculum innovation implementation (Pierce, 1974; Gross, Giaquinta and Bernstein, 1971). Planning capability also has a negative aspect--instead of facilitating implementation, it may also be used in postponing a decision to implement (Crandall, 1974).

Capability for planning is closely related to the capability for evaluation. Although evaluation, at least at first glance, would appear to encourage and enhance innovation, one study found that the collection of evaluation data was irrelevant in decision-making regarding the continuance of innovative projects (Berman, et al., 1975). A number of investigators have found negative relationships between evaluation and the diffusion of innovation in a school district. Havelock (1974) found such a relationship in a survey of 400 school districts and superintendents.

In a survey of Title III projects in California, Miller (1974) found a negative relationship between the amount of money allocated for evaluation and the continuance of an innovation. These efforts can probably be attributed to the dampening effect on enthusiasm that evaluation can have when little progress is revealed and, possibly, to a phenomena called "evaluation anxiety" in which energy is directed away from implementation and toward the development of defenses against evaluation (Glass, 1975). An alternative explanation is that evaluations are often applied before an innovation has had time to generate measurable effects.

Experience has shown that innovative effects and strategies not only change over time within sites, but also show an enormous degree of variability from one institutional setting to another.

The adoption of an innovation cannot be assumed to provide an accurate forecast of its actual implementation or use. The process of educational implementation is essentially a two-way one in which the strategy is modified to suit the institution, and the institution changes to some degree to accommodate the innovation. The implementation of an educational innovation can be thought of as an organizational process that, if successful, should produce an altered institutional arrangement, and an innovative strategy modified to suit that arrangement (Berman, et al., 1975).

An innovative strategy is a plan with a statement of goals and means designed to change standard behaviors, practices, or procedures. Projects differ in how concretely goals are specified and in how detailed the means are presented to the target group. Certain kinds of innovations tend to have abstract goals, lack specificity and clarity of means, and to have considerable uncertainty to the relationship between means and ends (March and Simon, 1958; Lindvall, 1964; Clark, 1956).

The project and its changes are only one of the factors affecting student outcomes. Indeed, it may be only a marginal factor. Student outcomes are (however measured) the result of the student's innate endowments, influence from the family, peer group, and community, and the characteristics of school experience not affected by the project (Levin, 1971).

Unfortunately, estimating these effects is extremely difficult, but analysis is necessary even if limited to measuring changes in student performances and attitudes relative to the situation before the project began. A standardized measure, such as achievement levels on cognitive tests would not be desirable (or feasible on all projects), since the educational objectives of change agent projects differ widely.

Instead, operational procedures need to be devised that measure the degree to which objectives, whether stated or implied, are met relative to the initial level of the target group on these objectives.

Such measures will probably be aggregate measures of the target group performance (rather than either individual measures or overall school district measures). Moreover, they must necessarily rely on the perceptions and judgements of local participants in the project. To reduce some of the obvious bias involved in these indicators, composite measures that average or weigh the various perceptions of actors at the same and at different levels might be useful (Berman, et al., 1974).

Summary: implementation literature. Literature on the implementation process is scanty and less consistent than adopter (support) literature. The "early" phases of the implementation processes are more fully covered than the "later" ones. Diffusion literature covers the awareness and adoption decision phases more intensely than implementation.

There are also models of the negative factors (aspects) in the implementation process. A model based on interviews with researchers who had rejected the use of audio-visual aids distinguished five phases of rejection: awareness, disinterest, denial, trial, and rejection (Eicholz, 1963).

The literature also discusses a number of alternative stages or phases. These models generally agree on making two distinctions among stages. The first is between the decision to adopt and the activities which follow that decision--the concept of implementation. The second is between the implementation phase which constitutes the initial use of an innovation and a later stage in which the innovation becomes a part of the school routine--the stage of incorporation.

The research emphasis in this type of literature is generally on strategies and products (i.e., characteristics of the innovations or the linkage used). Innovation adoption literature tends to focus on adopter characteristics and adoption units.

### Incorporation

The factors important in incorporation are the evaluation of a project's performance, effects and history. Also included in these factors are those which were prevalent in the support stage, but this time the considerations are less political than budgetary.

Survey of incorporation literature. There has been almost no research done on the long-term incorporation of innovations. Research into innovation discontinuance or rejection has also been neglected. Empirical studies of the incorporation process are rare.

There is an uneven attention bias, especially in the rationalist-diffusionist literature. There is a tendency to focus on the individual more than on his role in the organization, or on organizational characteristics. There is little attention paid to the organizational systems into which innovations are to be placed. Several critics have noted that there was little research on decision-making processes within the organization and call for greater research concentration on this aspect

(Carlson, 1968; Rogers, 1975).

Possible characteristics and factors in the incorporation stage.

Awareness: The source, type, extent, completeness, and flow pattern of information about an innovation in an adoption setting

Adoption Decision: Includes such aspects of the choice to innovate as: participants involved, strategy used in reaching consensus, commitments made, scope, and impact

Implementation: Includes such aspects of the initial period of use of an innovation as: type and extent of trial of the innovation; nature, scope, centrality, pattern, and degree of change introduced by the innovation; and nature and scope of adaptation of modification of the innovation

Incorporation: The length of time and degree of completeness for an innovation to become a standard feature of an adoption setting

Evaluation: The formal or informal determination of the extent to which an innovation meets staff expectations, is cost-effective, introduces reasonable changes, is feasible to implement, and, in general, constitutes an improvement over previous practice

Secondary Diffusion: The extent to which an innovation spreads from one adoption setting to others

The incorporation stage (when the project becomes part of the system's routine) represents the most serious commitment on the part of the school district. Federal "seed money" is withdrawn and the decision must be made not only whether a project should be incorporated, but also what components and on what scale a project should be used. Considerations of vested interests, established routines, and marginal utilities take on much more importance at this time than at any other point in the innovation process.

The incorporation of a project by an LEA can draw on the project's actual performance, its effects and history. It can reflect on the costs and benefits of the project relative to other considerations and alternatives. The existing school structure is only one of many possible alternative structures possible in that setting and the existing one is a barrier to the recognition and experimentation with alternative ones (Garner, 1966).

Continuation costs of critical parts of a project--such as paraprofessional salaries--may preclude district incorporation of a successful innovation. The decisions made at this point often mean that an otherwise successfully implemented project may fail at the termination of government funding (Berman, et al., 1974).

There is research on both the positive and negative aspects of adoption/incorporation reported in the literature. One recent study has collected positive data in insuring its permanent adoption (Berman, et al., 1975). Adaptive measures and practices which could help insure permanence are: development of local material, reduction or modification of abstract idealistic project goals, amendment or simplification of project treatment, and the downward revision of expectation in student and staff behavior change (Berman, et al., 1975).

Studies of the negative aspects of incorporation note that at times adaptations are carried to such an extent that they are adopted in name only. The essential features of an innovation may be modified to such an extent that their original value is lost. The innovation which is finally incorporated at the end of the implementation process may either be different from its original plan or have almost no modification at all (Hall and Alford, 1976).

The empirical studies which do exist generally seem to agree that the focus for the final adoption or incorporation decision-making rests largely on the teaching staff, with the administration granting the final approval. The teachers are the active element in initiation and incorporoation while the administrative groups (e.g., school boards) are the passive agent which retains the final decision to adopt or reject (Haber, 1963; Cobb, 1974; Hampson, 1971).

Conceptual or theoretical studies are a little more common. The Concerns-Based Adoption Model is an example of this approach (Hall, Wallace, and Dossett, 1973). The model describes seven stages or phases of use in innovation adoption/incorporation (Hall and Alford, 1976):

- Non-use
- Initial training
- Mechanical use (The trial (pilot) use of an innovation)
- Independent use (Limited individual use of an innovation)
- Integrated use (Collaboration and cooperation in use among individuals in an adopter organization)
- Renewing use (Evaluation and modification of the innovation occur)

Incorporation: summary. The variability of institutional response to an innovation ("mutation phenomena") emphasizes the extremely limited utility of programs and policy effect studies that look only at the relationship between treatment and student outcome (Berman, et al., 1975).

Levin (1971) argues:

> "The lack of similarity among the production techniques used by different schools may mean that neither average or frontier findings can be applied to any particular school. Indeed, in the extreme case, each individual school is on its own production function, and evaluation results for any group of schools will not be applicable to individual schools in the sample." (p. 23).

The credibility of project and policy studies is diminished by reviews which fail to confirm the earlier success reports. The American Institutes for Research (AIR) reviewed over 1000 programs and selected 100 for further study (Hawkridge, Tallmadge & Larson, 1968; Wargo, et.al., 1972). The following indepth investigation found that success did not remain constant when reinvestigated in following years, even though the specified independent variables remained constant.

The Ford Foundation (1972) assessment of its "lighthouse" projects showed the same instability and short life as AIR. Ford found that between adoption and implementation, or between implementation and incorporation, innovations disappeared or were modified beyond recognition (Berman, et al., 1974).

## Conclusions to study of educational innovation

Federal change agent programs are a challenge to the national educational system since they imply that the status quo is inadequate in some respects and that local change is needed. The federal policies are limited in that they are temporary systems designed to work reform from within or through the existing system. The programs are inexpensive for the district, so have a rapid rate of adoption, but a low rate of student improvement (Berman, et al., 1974). There are several possible reasons for this situation:

- Adoption is not an indicator of actual use, nor are changes necessarily ones which will aid student achievement
- The "slack resources" idea of some educators may direct funds to ancillary, not mainline, student services
- Change may be taking place, but at different rates than expected
- Schools may be held accountable for something they cannot do because of prevailing policies, incentives, and institutional structures

The research literature reviewed in this section seems to indicate a need for (Berman, et al., 1974):

- A more systematic understanding of the implementation process
- The reasons why an implementation process theory is lacking. There is a need to study the mutual adoption of the process and the institutional setting in which it is to operate
- A single theory which encompasses various organizational realities
- Multi-foci analysis of the processes within LEA's, SEA's, and within the federal level, plus links between and among the various levels
- Impact of innovation on the structure of LEA's and its processes to ascertain aspects of the system susceptible to change
- The effects, kind and degree, on the LEA's structure and processes in innovative implementation and incorporation

To restate a few of the difficulties already discussed, there is no consensus on many of education's organizational goals; the schools are politically and socially sensitive; and for some of them an operational definition is impossible and sometimes politically undesirable; the output-mix of education is only partly visible over the short term, and only parts of it can be measured and evaluated in terms comparable to the inputs. As a result, the analyst tends to pay more attention to those goals and outputs of education that can be quantified and measured, while the difficult-to-measure objectives are eroded or ignored.

General problems of innovation in educational systems: lack of knowledge of the school system and its culture. Part of the problem appears to be in the structure of the educational hierarchy itself. The literature seems to point to the fact that in spite of its apparent familiarity, we know little of how the system functions, or why it functions as it does.

Systems analysis studies are a relatively recent phenomena in the literature, and each is more or less concerned with a specific function or role within the system, not with an overall view of the basic institution. It seems realistic to believe that research should begin with a more realistic assessment of the political interdependencies and the balance of power throughout the system. It is uncertain if any field or discipline has come up with policies and measurements applicable to the problem of innovative change within the school culture. The existing studies have a tendency to use criteria which make it difficult to combine them into a composite picture of the whole. This appears as a very basic problem in the study of the literature--no one can study everything at once, nor is any observer impeccably neutral--therefore, the need for a standardized measurement.

In recent years, there has been a growing concern for improving educational outcomes. Educational planning for the future has combined with new developments in analytical methods for improving decision-making processes, introducing new ways of defining the problems of education and more sophisticated ways of finding alternatives, weighing their costs and benefits, and predicting their outcomes.

Although these new methods do help improve the process of educational policy formation, their introduction has been accompanied by an unfortunate misunderstanding of the analytical process and the features of the educational system.

These difficulties are to be expected when the methods were developed in such fields as defense analysis and economics and transplanted into education, but the side effects of rejecting a foreign body within the system may be reduced if there is a better understanding of the nature of the educational system and adjusting the new methods to its requirements.

The proposed innovations, lacking an understanding of the school system, also generally lack any clear guidelines or flexibility. The very fact that change is attempted suggests that there is an explicit idea or theory of what change is required. It also implies that the theory is relevant to the system in which it will be implemented.

The complexity of the educational system makes research focus a major concern. At one end, we are interested in the ways in which federal policy can affect education; on the other, we need to investigate how specific innovative projects affect students. The ideal theory of implementation would explain (or predict) how federal policy works its way through the various levels and jurisdictions of the educational system down to the classroom teacher (Berman, et al., 1974).

Problems of organizational research. The little organizational research that has been done has focused almost entirely on the district level characteristics, since districts are the most commonly studied unit of adoption (Hall and Alford, 1976). More study is needed on the characteristics of individual schools as adopting units. Several of the organizational characteristics that have been studied at the district level are not as applicable at the school level (for example, complexity, centralization, and the role of the superintendent). There is a need for a focus on the school level characteristics such as the role of the principal as well as the more commonly referenced district level characteristics; adoption may occur on a school rather than a district level, and implementation may vary significantly across buildings.

Coverage of the adoption process characteristics as was noted before, is not only more limited than that of adopter characteristics, but is also uneven. Again, earlier phases of the adoption process tend to be covered more than the later phases. Characteristics of the awareness and adoption decision phases have been covered more than the characteristics of the implementation-incorporation phase.

Lack of adequate criteria and methodology - definition of problem.

There is no set or efficient methodology for measuring functions within the system. Each observer tends to look at the system in terms of his own discipline, and in many cases, bias. The answer to this is the development of some common type of measurable data and a viable method for its correlation (Sarason, 1969; Berman, et al., 1974-1975).

The problem of interpreting outputs is additionally obscured by a lack of adequate criteria which lead to a clear concept of what type of change is expected, and sufficient instruments with which to judge its validity. The intended outcome is rarely stated clearly, and when it is, by the end of the process it has usually managed to get lost or obscured. Planners often gloss over the relationship between the means and the ends. The researcher or observer is placed in a position of interpreting data from an experiment with little clear idea of the methods used to employ it or data on how to use it.

There is also a wide diversity in types of goals. The material goals are often the easiest to implement. New text books, etc., are a comparatively painless operation to the system; a structural one is more difficult. Without clear guidelines and a clear statement of goals, the material can often become a goal in itself and change measured by it.

Most studies suffer from serious methodological problems and difficulties which can make the pessimistic conclusions of retesting premature. If a project yields results of "no significant difference," it may be that the project did not work, or it may be that all important variables were not included in the evaluation model. Somewhere between the stated program inputs (which are specified) and the program effect (which is measured), important factors may be affecting the relationship between theoretical input and actual output, but are not specified. Unspecified variables can have important first order effects, and their omission can result in a "no significant" relationship between success and the specified variables (Berman, et al., 1974). Issues relating to empirical validity have been raised but not satisfactorily answered (See e.g., Levin, 1971; Cronbach & Furby, 1970).

Complications of adoption study. Study of the adoption process has been complicated by several factors. One of these is that the literature offers no generally recognized criterion for the definition of adoption. The studies provide little information about specific successful strategic methods, necessary components, or even what constitutes success. Studies describe innovations as "adopted" at various phases of the adoption process. The decision to use an innovation, trial use of an innovation, pilot implementation, and full implementation are among the various criteria used in the literature to define adoption (Hall and Alford, 1976).

Even if general agreement could be reached on using a particular process phase as the criteria, the definition would still be complicated by considerations of unit and adaptation. For example, if a school district is used as the unit of adoption, what percentage of classroom or school units would have to implement an innovation to qualify the district as a whole as an adopter? What percentage of a district's central staff, principals, or teachers would have to be aware of an innovation before the district as a whole could be considered aware? Regarding adaptation, at what point in the adoptive process does an innovation lose its identity and become something else which is adopted in its place (Hall and Alford, 1976)?

In addition to a solution to definitional problems, more adequate measurement of the adoption process is needed. Basically, there are three types of measures available: observation of adopter activity, examination of adopter records, and self-report by an adopter official. Most studies have relied on adopter self-report despite this measure's obvious selectivity and subjectivity. To increase the validity of adoption measurement, self-report should be accompanied by other measures (Hall and Alford, 1976).

Another measurement need which is identified in the literature is for the collection of data describing the adoption process over a number of different points in time. Most studies measure adoption at only one time point. Adequate measurement of any process, including those of innovation and linkage requires the collection of data at more than one point in time, but the need for data over-time is particularly great in the measurement of the adoption process. Retrospective self-reports of activity carried out during the adoption process are particularly subject to bias, and existing records may be inadequate to describe the process as it actually occurred. (Hall and Alford, 1976).

Impact of personnel problems on innovation. The school system is described by Sarason (1969) as a hierarchical subculture with its own set of built-in conflicts, demands, roles, and role relationships. As a subculture, it is viewed in two different ways: by those who exist within it, and those who view it from the outside. School personnel tend to view the school via their position in its setting. This is compounded by the school's relation to the primary culture--the government is expected to, and does, take action to solve a social problem at its root, i.e., the school.

The goverrment is an outsider to the system with an outsider's view of characterizations of the school which may not apply. Many of the people who plan or play a role in educational planning have no other first-hand knowledge of the school system than their own experiences as students (Sarason, 1969). All of the observers are in one way or another influenced by their own educational background. Perhaps those perceptions tend to blind them to the differences which exist within the system.

We know less than we should about many aspects of school culture. We tend to look at it in terms of values and personal experience. This method does provide some insights, but also tends to put blinders on what is observed, how it is observed, what is chosen to change, and the data it used and evaluated.

The school system, like other large bureaucracies, does not eagerly search for change, nor does it react enthusiastically toward it. The way things are is the way things were meant to be (Sarason, 1969). If school personnel do not completely understand their own system, the outsider is placed in an even more awkward position. Those who attempt to introduce change rarely have a clear perception of the system or the psychological/sociological aspects underlying it. Many change agents are seemingly unaware that others don't view the system in their terms.

The ecological dominance and protectiveness in which the educational system exists shapes policy formation and determines many of its constraints. One of these is passiveness: all major policy decisions are made outside the organization, leaving only second-rate policies to be determined by the educational organization itself. This imposes crucial constraints on the development of the organization, mainly in regard to the type of people who enter such an organization, their characteristics and patterns of work, their inclination toward change, which in turn affects the dynamic character of the educational organization (Guba, Bidwell, and Jackson, 1959; Carlson, 1962).

Classroom curricula and behavior are fairly standardized and predetermined. Change leads to a disruption in both the teacher's expectations and a "drastic" alteration in the classroom status quo. To change "normal" classroom patterns, there must be knowledge of the covert principles and theories which underlie these patterns. Another question which seems little studied is the effect on the students' self-expectations, and on the alterations in teacher expectations.

The classroom teacher is the primary, and nearly the sole means of achieving educational innovation. The success of the project is measured by its success on this "grass roots" level. There are two problems inherent in this type of teacher autonomy (Sarason, 1969):

- The method in which the project is introduced to the teacher
- The teacher's conception and reaction to the project

A frequent complaint of teachers is the system's lack of courtesy and understanding of the role they must play. They are the ultimate unit of implementation, and often the last to be told of the change and its personal implications for them. Teachers often stress "good ideas," but "bad" methods of implementation. They feel they are often faced with sweeping changes and forced to unlearn old ways and learn new ones, often in an incredibly short span of time (Sarason, 1969).

Dealing at this level is both personal and institutional. When people are required to change, there is an inherent resistance, even if the change is recognized as a "good" one. Resistance will increase if the atmosphere is that of what are considered trampled rights. Any change process is a means of personal control and will be followed along the line of least resistance and personal trouble. A change introduced into an unfamilar setting is risky, one which is introduced into a hostile one as well is even more likely to fail. Something must be done to handle the problems of a hostile environment or to counter ways in which change can be sabotaged.

The change in a role perception is a difficult one and one that can not be accomplished by legislation and/or regulation. It appears that only involvement can alter the attitude toward change. Involvement, and a fairly long and detailed one, can make it more likely that responsibility will be assumed. There is also more chance that innovation problems will be formulated and resolved. Involvement can also act as a control on premature rejection of change and a tendency toward rigidity (Sarason, 1969).

Since there is virtually no other means of implementation beyond the teacher's knowledge and the relationship he establishes with the students, the teacher-class relationship is a fairly self-sufficient one (Elboim-Dror, 1970). The teacher is ultimately responsible for the children and classroom problems. The reward system between student and teacher is one in which the rewards are often nonverbal and normally indirect.

If the rewards of change do not equal or exceed the disruption that innovation involves, there is little reason to assume that the teacher's motivation to innovate will remain high, or that changes won't be made which bring the change nearer to the more satisfying status quo.

The educational managerial system (administration) uses rewards and sanctions also in order to direct teachers in their role performance, but its influence is limited to activities which can be measured, tested, evaluated, and sanctioned (Haber, 1963; Cobb, 1974; Hampson, 1971).

In the broad socializing process in which teachers are engaged, many activities can not be handled in this manner. Education's uniqueness in this respect helps account for the amount of freedom teachers enjoy in their work. The degree of the teacher's acceptance and identification with policies and projects which direct their work, especially those with intangible goals, is the determinant of the success of those policies.

The push for change generally comes from outside the school system and seems to be based on the underlying assumption that goals can be changed independently of any other variable in the system. There also seems to be a general assumption that those who are outside the system understand it better than those within it. Programs are rarely tested in a complete school atmosphere, a practice which leaves the question of how closely they will be related to the reality of the system into which they are to be introduced.

Policies can be generated by court decrees, administrative arrangements, budgetary pressures, and law enforcement. While policies can be formally enforced from the outside and even be endorsed by the administration, the aims of the project will not be achieved without the teachers' goodwill and their identification with its spirit and values. A teacher who is hostile to the project will not educate his students toward acceptance--he might even generate hostility toward it. There are as yet no available, reliable measurements that can objectively evaluate the teacher's classroom performance from the point of view of implementary innovation.

The goals of change are rarely stated in terms of the three groups of institutional relationship they will affect (Sarason, 1969):

- Among professionals within the school system
- Among professionals and pupils
- Among professionals and the different parts of the larger society

Many proposed changes will affect, and be affected by, all these types of socio-institutional relationships.

Disruptive patterns in decision-making. Patterns of decision-making are vitally important in the adoption of innovation, but have been little studied. There are several main features and patterns of educational policy decision of which the last two are the most important for this section:

- Lack of feedback
- Diffuse discretion
- Heuristic decision-making
- Limited use of analysis and limited search for alternatives
- A tendency toward incremental change

Limited use of analysis and limited search for alternatives. Educational decision-making operates on the assumption that education is unique because its policies are determined mainly by value judgements and therefore can not benefit from analytical methods designed to improve the rationality of the decision process. Although this attitude is slowly changing, it still represents a barrier to better policy-making in many educational systems (Elboim-Dror, 1970).

That educational policy formation processes are determined largely by value judgements is not unique in itself, but its scope and influence on other variables is important. It means that special attention must be paid to the political and social feasibility of policies and projects, not only the economic costs and benefits.

The most serious damage produced by this attitude is that the decision-making process is limited to the search for alternatives in solving educational problems and forecasting their possible costs and benefits. Only rarely does decision-making include systematic analysis of the cost benefits and cost effectiveness of possible alternatives. Unfortunately, educational decision-making is characterized by a reliance on solutions that worked more or less well in the past, with nearly no effort to find new alternatives that might bring a new solution to the problem. This is why so many educational "answers" lack imagination and novelty and are only partial solutions to crucial problems. The reasons for this are not only the nature of "satisfying man" as described by Simon (1965) but also the fear of explicating value judgements and putting price tags on goals (Elboim-Dror, 1970).

Tendency toward incremental change. The dominant pattern of educational decision-making is by incremental (gradual) change.

Because of the tendency to avoid explicating value judgements, the strong sense of uncertainty and lack of information, the long wait to be able to evaluate results, and education's dependence on its environment, few decisions are reached by long-range planning methods of stating goals, looking for alternatives, and forecasting their possible costs and benefits. The educational system tries to adjust to its environment and solve its problems by using incremental changes to "muddle through"

(Lindblom, 1959; Braybrooke and Lindblom, 1963). By reliance mainly on experience and slight changes, the system minimizes the risks of uncertainty, slowly acquires feedback information, and delays crucial decisions until a crisis occurs (Elboim-Dror, 1970).

Problems of innovation in the LEA - factors in the innovation problem: The problems of LEA change fall generally into three very general categories of variables (Sarason, 1969):

- The scope of the change
- The period of time in which change is to occur
- The number of alternatives available for flexibility

The scope of innovational change. Most innovative changes involve at least a majority of schools within a system or district. The size and complexity of the school district and the variance of the schools included within it preclude that different schools will respond to change differently and their implementation methods will vary--perhaps simply because of attitude and/or numerical differences in personnel.

The viability of innovational change. Needed innovative change in one school or school district may not justify its implementation in the others--at least at that time. The word "change" itself implies alternatives; in some settings, an alternative might prove more effective than the originally proposed innovation.

There is also an often overlooked variable by many change agents, the type of problems and changes which already exist in a given school or district. There may be a need to solve these existing problems before the root cause is discerned and innovation implementation is able to succeed. In other words, what changes have to be made before the innovation is introduced, or the minimal conditions for its implementation exist (Sarason, 1969).

The site of innovation. Where should change begin within the school structure? The change agent is assumed to have knowledge of the target schools and the relationships within them. Because of the lack of knowledge of the educational structure displayed in the research literature, it seems likely that there is little evidence that he is equipped with information that goes much beyond the realm of bare statistics. Because schools differ, it is perhaps safe to assume from the literature that the initiation point should probably differ.

The research literature appears to emphasize the problem of introducing an innovation in a manner which makes it both acceptable and feasible for all groups involved in the change. How is the change presented to the target group? Are there dictates from on high, or is there possibly some "democratic" method of introducing the change to all concerned? What is explained, and in what depth? Does anyone actually explain the implications which innovation represents for all groups involved? Due to the complexity of the levels within the educational institution, this conclusion appears difficult, if not improbable. Much of the importance at this point depends on the ability and flexibility of the change agent.

Most introduced change runs into difficulties in the classroom environment--problems which stem from the same sources and attitudes which innovators at times accuse teachers. They usually do not begin a project by asking why and how teachers think and act as they do, while they criticize them for not being sensitive to what, how, and why children think and act as they do. At times, innovators seem to think change is "wrought" by telling people what the "right" way to think and act involves, i.e., the same accusations which are brought against the teacher can often be applied equally well to the change agent himself. (Sarason, 1969).

The literature seems to indicate that the ideal situation for change would be stated in terms of how it will directly affect the teacher and his role, and that the change in role is presented as non-threatening and an expansion in role scope and importance.

Each person in the hierarchy has their own idea of the system, accurate, or not, by which they perform their roles. Most personnel agree that there is a system, run by a vague group of administrators in some locus, and that it is the most efficient at placing obstacles in their path. The main objective of those within the system is to protect themselves from it (Sarason, 1969).

This type of view assumes an inflexibility which may exist within the system, but does more to influence the attitudes and motivations than a direct edict. In other words, what happens within the system need not necessarily be what the system will permit or tolerate. It does signify what the personnel assume it will permit and tolerate. Actions, regardless of whether they reflect an internal or external orientation, are always mediated by a blend of values and ideas.

The change agent is the mediator between the federal policy makers and the innovators. His efficiency would rest, at times, upon his own flexibility and how well he can change his approach to accommodate necessary modifications within the innovation while still retaining its basic integrity. Those seeking to implement change may have neither the time nor personnel to adequately oversee all aspects which an innovative change requires.

According to some studies (e.g., Berman, et al., 1975), the change agent is primarily effective in the stage of initiation/support/adoption, but has little effect on the implementation of local innovation. This suggests that federal change agent policy is limited by the motivations of the actors within the institutional setting and local implementation strategies.

These factors raise several questions. How could the effectiveness of the change agent be altered if he were to work within the institutional structure during the process of innovation incorporation and implementation? Knowledge of the system is stressed in the literature, but so also is the problem of inexplicit guidelines, poor information gathering and material processing.

The second question is that of availability. Is there any type of follow-up presentation which would help solve problems once the innovation is in progress? Unexpected snags and problems can develop which are unseen when the project is still on paper. It appears that federal policy makers should consider ways and methods of encouraging mutual adaptation strategies to enhance receptivity to change.

By reading between almost nonexistent lines, the literature appears to overlook the effect of innovation continuance on institutional personnel in their midst. It would seem logical that unless there is some more communication between change agent and innovator than an introductory series of meetings, the project and its advocates would be viewed as strangers who merely pass through, with no stake in the school or the project itself. If something is not important enough to follow-up on by the change agents, why should the LEA expend any more effort to implement it?

The period of time in which change is to occur. Any attempt to introduce innovation carries, either implicitly or explicitly, a time period in which it should be accomplished and what outcomes are expected. The time period in the literature appears to be frequently underestimated, if it is considered at all. This underestimation can lead to frustration, evaluation anxiety, and pressure. The frustration of inadequate results can help promote a hostile environment, the eventual aborting of the project, or a change in the intended outcomes (Berman, et al., 1975).

Time is rarely seen as a problem in the literature, nor is it usually specifically defined in the proposals. It seems to be considered by many researchers as less important than the school culture and the structure of the educational system. Few change agent projects consider that the rate of innovation will differ for different schools, and sometimes within schools.

It is perhaps unrealistic to expect the absolute (mean) improvement or the rate of (mean) improvement to be high, particularly in the rather short time span of most innovative programs. It could be argued that given the highly stable nature of the educational system, one would expect to find only incremental change at the leading edges, and that such changes would cumulate slowly. The incorporation or institutionalization of the changes anticipated by federal policy makers, then, would be expected to occur slowly and over time, not in the October to May time frame usually employed by the evaluators (Berman, et al., 1974).

## Summary

The literature has shown that organizations and schools differ in their ability of change, both between and among themselves. There are many schools in which the implemented change quickly loses its appeal, and its original innovative intent. There are several possible theories which can be generalized from the discussion and the literature:

- The tendency for proposals to originate at the top of the hierarchy and filter down to the LEA often ignores the feelings and politics of the innovative actors. Teachers tend to generate personal turmoils when their rights are encroached which can take a toll on the proposed innovation, its acceptance, and their willingness to carry out the goals required in the project.
- Due to inadequacies, current methodology is not sufficient to measure the change required in the LEA and SEA, nor complete and accurate enough to act as guides for federal policy.
- There is a very real need not only for more accurate and inclusive measurement instruments, but also for instruments which are adjusted and refined enough to allow their use as a guide for both policy makers and innovators.
- The school system is misunderstood by much of society and many of the researchers. Its complexity is an asset and a barrier to change, but one which must be fully understood in order to provide the researcher with an acceptable degree of accuracy.
- There is a need for interdisciplinary action and sharing. The problems of the school are not merely statistical and social, but problems which will have to find their solutions from a variety of disciplines and approaches.

# CHARACTERISTICS OF COMPENSATORY READERS:
# ASPECTS OF READING NOT LEARNED BY LOW ACHIEVERS

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The development of optimal systems of reading instruction for children who have not achieved a normal level of reading proficiency, may be improved by taking into account the characteristics of the children for whom this instruction is intended. We will present some of the salient qualities of poor readers that may be valuable for thinking about teaching. The aspects of reading that will be considered will be limited to cognitive processes that we suppose are important in reading and may be relevant to the development of instruction.

While we do not presume to be able to define reading until more basic research has been completed in the field, we wish to make our assumptions about the process of reading explicit. We suppose that in English, reading often involves decoding, a process of translating a printed alphabetic code into a form that may usually be fairly well represented in spoken language. Decoding at a rapid pace may be valuable for comprehension, particularly among children who are about the fourth or fifth grade level in reading or higher. The process of reading entails attention to meaning which is controlled at least partly by the reader's purpose for reading a given selection of written material. During the course of reading, processes of language comprehension occur as they do for spoken messages. The syntactic and semantic features of sentences are perceived and encoded into memory, at least temporarily. Finally, meanings of sentences and discourse are elaborated and transformed by the reader to make them consistent with his knowledge of the world and to facilitate long term memory of newly acquired information (Guthrie, 1976). While we suggest that these processes may be important for a full account of reading, they are not exhaustive, nor have they been fully studied. However, we will present the ways that good and poor readers have been reported to differ on these dimensions.

It should be noted that a variety of noncognitive variables are important in learning to read, although they will not be considered here in detail. For instance, emotional instability has been often suggested as a cause and as a result of reading failure (Vernon, 1971). The expectations of children about whether they will excel or have difficulty in learning to read has been recently reported by Entwisle (1976) as a causal factor in reading achievement. It has been widely documented that socioeconomic status (Whiteman & Deutsch, 1968) is correlated about .5 to .6 with reading achievement in grades four to six, although the specific sources of this influence have not been fully traced. Numerous analyses of neurological functioning including dichotic listening (Kimura, 1961, Bryden, 1970),visual evoked responses (Preston, Guthrie, Childs, 1974) and post-mortem examinations (Benson, 1976) have confirmed that neurological dysfunction cannot be discounted as a source of reading difficulty for some individuals.

Reading is more than a cognitive process. It is also an affective activity with socioeconomic influences and neurological prerequisites. However, these factors are usually thought to be less amenable to educational change than cognitive processes. While one cannot change a child's socioeconomic level easily, it may be possible to improve his proficiency in a cognitive process such as decoding.

To examine aspects of cognitive functioning that are relevant to reading instruction, one must study tasks that are specific to reading. Many investigators have attempted to study analogs of reading. One of the most common is the Birch and Belmont task that requires the child to match a series of dots printed on paper with spaces between them of varying widths to a series of tones presented auditorally with time intervals between them of varying lengths. This "auditory visual association task" is thought to be an analog for reading (Kahn & Birch, 1968). However, there is no reason to believe that the cognitive operations needed to perform this task are similar to those of reading. The dots on the page do not contain critical features like letters or orthographic rules like words. The auditory tones that are few in number and meaningless bear little resemblance to complex meaningful spoken language. The reported correlations of about .3 between performance on the Birch and Belmont task and reading achievement lead only to the inference that reading involves auditory visual association, a fact that is inherent in reading any alphabetic writing system. Another shortcoming of an analog is that it does not provide useful prescriptive information. To know that a child is low on a dot pattern task does not provide any indication about what kind of teaching to give in reading, since we would never give training in associating dot patterns or training in serial memory for tones. The same problems occur for the use of hieroglyphs as stimuli and CVC trigrams as responses, or pictures as stimuli and words as responses that have been used by several investigators (Vellutino, Steger, Harding & Phillips, 1975).

References in this review will be made to children who are low achievers in reading or poor readers. We are referring to children whose reading achievement is lower than would be expected based on relatively normal intelligence; retarded children with IQs below 70 are excluded from these generalizations. We are also referring to low achievers in reading as a group, since there is little conclusive systematic evidence that subtypes of poor readers can be reliably distinguished. Although it is intuitively compelling that there should be many reasons for a child to fail to learn a skill as complex as reading and that different children should fail for different reasons, systematic evidence on this point is notably absent. Satz presented a theory that the causes of reading failure were different for children of different chronological ages. He suggested that inadequate perceptual and memory processes would be the source of poor reading for children in the seven-eight year range; whereas language processes would be the source of reading problems for children in the eleven-twelve year range. However, his data did not unequivocally support the notion. Language problems were evident for both age groups on his tests and a motor component in the perceptual tasks made the results difficult to interpret (Satz, Rardin & Ross, 1971).

One proposal that merits further study is that some children comprehend poorly due to inadequate sight vocabulary; whereas other children comprehend poorly due to inadequate skill in organizing and reasoning with complex relationships in discourse (Cromer, 1970.) Notwithstanding one report (Levin, 1973 ) there is little evidence on the cognitive or educational differences of these subgroups.

A corollary to the proposition that there are subtypes of poor readers is that there are also different types of instruction that are optimal for teaching these different types of learners. The available evidence on this point is extremely thin, but nevertheless negative. For instance, Robinson (1972) divided children into one group with visual aptitudes and another group with auditory aptitudes. Half of each group were taught with a sight method emphasizing words and sentences; the other halves were taught with a phonics emphasis that included teaching letter sounds, blending, oral reading, etc. Only 11% of the children were either high visual-low auditory or low visual-high auditory, indicating that extreme discrepancies in modality aptitudes were rare. There were no consistent differences between the methods of instruction nor were there any significant interactions between instructional approach and modality aptitudes. In other words, previous research has not identified a means by which to subdivide poor readers into different groups so as to allocate instruction differentially and increase the efficiency of teaching.

In examining the processes of reading that are not easily learned by children who are poor readers, it is sensible to separate children into different age groups. The processes that are undergoing rapid acquisition may differ at different age levels. For example, perceptual, memory and decoding skills may be demanded heavily and acquired rapidly in early stages of reading that often occur in first and second grade; whereas language comprehension and the application of previous knowledge to the content of written material may be heavily demanded and undergo rapid acquisition during later years in grades four through six. Consequently, primary and intermediate levels will be examined separately in this review.

It is valuable to note that a substantial amount of variability in reading achievement is established at an early age. Newman (1972) conducted a longitudinal study of 230 children from first through sixth grades. The children were average intelligence, but the group contained a disproportionately large number that were lower than average in reading readiness at the beginning of first grade. Despite this restricted range, the correlation of word recognition, viz., the word reading subtest of the Stanford Achievement Test, and reading comprehension at sixth grade, viz., reading subtest of the Iowa Test of Basic Skills, was .52. Word study skills at the end of first grade correlated .58 with reading comprehension at the end of sixth grade. In other words, about 25% of the variance in achievement at the end of sixth grade could be accounted for by achievement at the end of first grade. Mackworth and Mackworth (1974) report another reason for investigating the reading problems of children at a young age. They administered an identical test to children in grades one, two, four and six. The measure required the identification of upper and lower case letters, and judgements about whether word pairs sounded the same. The words were identical (cup-cup), different (pain-pair), or homophones (bear-bare). There were very few errors, for anyone, on the identical items. However, on the homophones, poor readers made more errors than good readers at all grade levels from first through sixth. Both good and poor readers improved in proficiency, but the poor readers were consistently worse than good readers at all levels. Speed of decoding was measured by judging the reaction time on each word pair. On all categories of words, poor readers were slower than good readers at all grade levels. Poor readers and good readers both improved as grade levels increased, but poors were worse by a constant amount. In other words, the problem of decoding that appears in first grade appears to persist until the end of elementary school.

It makes sense to ask whether achievement at the end of first grade is highly related to measures of readiness taken before the entrance to school. The widely circulated study of Jansky and DeHirsch (1972) reported that letter naming in kindergarten correlated .54 with reading achievement at the end of second grade; word matching correlated .45 with achievement, and the similarity subtest of the WISC correlated .53 with end of second grade achievement. Other evidence from Newman (1972) is that the WISC verbal subtest correlated .46 with word recognition at the end of first grade and that was superior to Metropolitan Readiness Test or the Murphy-Durrell Analysis of Reading

Difficulty Subscales in predictive power. First, we may note that the correlations between performance in kindergarten and end of first grade are in the moderate range, accounting for about 20% of the variance. Second, we may note that the most powerful predictors during kindergarten include the WISC subtest that is a measure of intelligence, the Metropolitan Readiness Test that is a global assessment of school readiness, and letter naming that is notorious for the absence of its causal relationship to reading achievement. These indications are that the important antecedents to reading are global factors that relate to all school achievement and specific cognitive precursors to reading failure have not been identified. What is clear, however, is that what is learned or not learned during first grade facilitates or inhibits reading proficiency at later ages. Since later achievement seems highly related to early proficiency, it seems prudent to give emphasis to study of processes that are not easily acquired during early stages of reading acquisition.

Characteristic strategies of children learning to read in first grade have been studied by the examination of oral reading errors. The strength and weaknesses of good and poor readers may also be examined with this procedure. Weber (1970) systematically collected the oral reading errors of 43 first-grade children over a five-month period. At the end of the year the children were divided into those with relatively high reading achievement, about 2.6 grade level on the word knowledge subtest of the Metropolitan Achievement Test, and those who had relatively low reading achievement, about 1.8 on the word knowledge subtest. The extent to which children possess appropriate language comprehension processes and deploy these operations during the course of reading may be judged by the grammatical acceptability of the oral reading errors. Good and poor readers did not differ on this count. The high achievers in reading had 93% of the errors grammatically acceptable in the context of the sentence preceding the error. Low achievers in reading had 89% of the errors grammatically acceptable to the preceding context. In a second class of children, the differences were equally negligible. Apparently, all children regardless of reading level use the grammatical cues that precede a word in the sentence for identification of that word.

One might also ask how frequently good and poor readers make errors that are grammatically inconsistent with the entire sentence. Using the criterion that an error must be grammatically acceptable with the context occurring before and after the error within the sentence, good and poor readers seem not to differ significantly. Among high achievers, 68% of the errors were consistent with the entire sentence; and among low achievers, 56% of the errors met this criterion.

Confirmation of these findings have been reported by Biemiller (1970). He developed a criterion of contextual acceptability that required that an error be both grammatically and semantically acceptable in terms of the preceding context of the sentence. Using this criterion, children at high, medium and low achievement levels in reading at the end of first grade had the following percentages of errors that were contextually acceptable: 84, 84 and 81. In other words, the extent to which children use grammatical and semantic cues in identifying words is equally high regardless of reading ability level at the end of first grade. Biemiller also illustrated that contextual acceptability of errors is consistently high throughout first grade. In the earliest stages of reading for all first graders in his study, the contextual acceptability for the high, average and low ability groups were 86, 62, and 78 percent correct. This implies that children enter first grade with language capabilities that are sufficient for the task of reading, and that they perceive reading as a languaging activity regardless of reading proficiency level. Inadequate language capacity or language usage do not seem to disrupt early reading acquisition for children who speak English as a first language and who do not have another obstacle to learning to read, such as a gross neurological impairment.

The extent to which first graders attend to graphic and phonological cues for word identification was also estimated by Weber (1970). She reported a graphic similarity index that was used to code each error in terms of the similarity of the graphic features of the error to the original word. This index was based on number of shared letters, similarity of length, and appropriate weights for these variables. Low achievers in reading at the end of first grade had a mean of 256.47 whereas high achievers had a mean of 407.87. The graphic similarity of errors for high achievers was higher than for low achievers. This suggests that high achievers attend more closely to the graphic cues in words and give oral responses that are more consistent with the rules of pronunciation that may be used for written words in English. Using a simpler index of graphic similarity, Biemiller (1970) illustrated that good and poor readers differ at the end of first grade in the graphic similarity of their oral reading errors. In later stages of acquisition, he reported the high ability group had 50% errors that were graphically similar, whereas the low ability group had 26% graphically similar errors. The lower group had not improved over the course of first grade, although the high ability group had increased their graphic similarity scores. This suggests that the primary process that is acquired in the first year of learning to read is decoding proficiency. The speed at which children learn to read seems to be related primarily to the time required to learn proficient decoding strategies.

Assuming, for purposes of discussion, that acquisition of proficient decoding represents the major problem in early stages of reading, we may next ask what cognitive processes lead to difficulty in decoding. Williams (1975) following a review of 83 studies, takes the position that "auditory skills" represent the major hurdle for young readers. These skills are said to include auditory discrimination, memory, sequencing ability, analysis and synthesis. She notes that a proliferation of correlational studies was initiated by Monroe (1932) illustrating relationship between auditory discrimination and reading level. Other correlational studies have pointed to the importance of distinguishing separate sounds and words or phonemic segmentation, blending sounds including phonemes to one another, and phonemes to syllables, and other tasks requiring the manipulation of sequences of sounds. Pressing her point, she notes that there have been a few studies illustrating the impact of training in auditory skills on reading achievement. For instance, identifying phonemes and words by counting them individually was found to facilitate word analysis, e.g., pronouncing unfamiliar words. It seems reasonable that a child must be able to segment the sounds in the stream of speech into units of subword length if decoding is to be learned. Since decoding requires the acquisition of orthographic rules that map letters and letter sequences to sounds and syllable units, the child must be capable of locating the constituents in the visual and auditory domain. It appears that the visual discriminations and segmentations are fairly simple in comparison to the auditory analysis that is necessary for a child to learn orthographic structure and rules for decoding.

Detractors from this position (Hammill & Larsen, 1971) argue that the relationships between auditory skills and reading are too weak to have any importance in practice. While conceding this point, we submit that the best available evidence suggests that inadequate development of auditory discrimination, segmentation, and memory blending are good candidates as cognitive processes that account for delayed acquisition of decoding operations.

The problems of poor readers may also be examined by identifying instructional variables that are particularly important for low achievers in reading. If a certain instructional orientation, for example, emphasis on phonic skills, has a decided benefit for low achievers, the proposition that low achievers are characterized by inadequate phonics and word analysis skills is supported. Consequently, we examined the content of instruction, among other variables, in a substantial number of published reports of teaching programs for remedial readers. To our regret, the content of the programs and methods of instruction were described at such a superficial level that comparisons could not be made with any confidence (Guthrie, Seifert, Kline, 1976).

Despite some opinion to the contrary, we believe that the fabled first-grade studies may be at least partially conclusive in regard to instructional effects in first grade reading (Bond & Dykstra, 1967). To interpret this study, we invoked a series of decision rules: 1) only the word reading and paragraph meaning subtests of the Stanford Achievement Test were used. Other dependent variables were not included. 2) Analyses of covariance were interpreted and the analyses of variance were not examined. For a given contrast, for example, between basal and basal plus phonics, two analyses of covariance were conducted, one with all of the readiness measures and pretests combined as the covariate and a second with the readiness measure or pretest that was most strongly correlated with the posttest as a single covariate. For a given comparison, say between basal and phonics plus basal, several project sites were included. Examining across project sites, it was decided that if either analysis of covariance illustrated that there was no difference between the treatment groups and there was no interaction between the treatment groups and project sites, the contrast would be regarded as not having produced a significant difference. In other words, if differences that might have been present could be eliminated by either system of covariance analysis, the difference was regarded as negligible. 3) For a given contrast if both covariances showed a treatment effect in the same direction and there was no disordinal interaction with projects, the treatment effect, i.e., the difference between methods of instruction, was considered to be present.

Using these decision rules, several conclusions were forthcoming. First, children learned decoding as measured by the word reading subtest of the SAT more efficiently by a skills method than a language-oriented approach. When word reading was used as the criterion, linguistics was superior to basal and phonics/linguistics was superior to basal. Two language-oriented approaches, e.g., language experience approach and basal, were not different in their impact on word reading. In addition to the apparent benefits of skill-based approaches over basal for word recognition, we found that combining phonics and basal was noticeably superior to basal alone for teaching word reading.

When the paragraph meaning subtest of the SAT was used for the dependent variable, employing the same decision rules, there were no consistent differences between skill-based and language-based approaches to instruction. Linguistic and basal approaches did not differ; phonic/linguistic was superior to basal; language experience and basal did not differ; and basal combined with phonics was superior to basal alone. Apparently it did not happen that language and comprehension-oriented approaches to instruction were more effective than decoding and skill-oriented approaches for teaching reading comprehension.

These findings are consistent with the results of the oral reading error studies. These studies suggested that it is decoding that is learned primarily during the course of first grade. The first grade studies illustrated that skill-based instruction which emphasizes decoding had an edge in efficiency over language-based approaches in teaching word recognition and decoding. Concurrently, since comprehension is not an area that needs a dramatic amount of improvement in first grade according to the oral reading errors studies, it follows that instructional variations should not influence reading comprehension. This prediction is confirmed by our re-examination of the first grade studies.

Another instructional variable that may shed light on the characteristics of poor readers is amount of teaching time. Harris and Serwer (1966) showed that the amount of time spent engaged in explicit instructional activities pertinent to reading correlated .56 with the word reading subtest of the SAT and .55 with the paragraph meaning subtest of the SAT. In contrast, other more peripheral activities such as general discussion, art or dramatization, had no significant relationship to achievement. Needless to say, the investment of time itself will not increase reading achievement. Time must be spent in fruitful ways. Amount of time spent in a language experience approach in which a considerable amount of time was spent in field trips and writing but very little time in reading activities did not correlate significantly with reading achievement. Another illustration is provided by Ball and Bogatz (1973). They reported that increasing the exposure of children to the Sesame Street program increased reading achievement in first grade markedly.

Hypotheses about the relationships between amount of instructional time and characteristics of students and reading achievement have been recently forwarded by Wiley and Harnischfeger (1974). An update of the Carroll (1963) model of school learning, this outline suggests that achievement is determined by 1) total time needed for a child to learn a task and 2) the total time the child spends learning the task. In other words, achievement is a function of time required for instruction and time allocated for instruction. Their data illustrates globally that exposure in terms of hours of schooling per year is related to achievement in reading comprehension. They concluded that "in schools where students receive twenty-four percent more schooling, they will increase their average gain in reading comprehension by two-thirds... the amount of schooling a child receives is a highly relevant factor for his achievement." (p. 9) Implicit in this model is the proposition that children who need a large amount of time to learn reading will benefit more from increases of instructional time than children who need less time for learning to read.

We propose that the amount of time a child needs to learn to read may be estimated by his previous achievement in reading, assuming that he has been given the same amount of exposure to instruction as other children in his peer group. Consequently, if children who read poorly benefit more from increases in amount of instructional time than children who learn normally, it is possible to characterize poor readers as needing larger amounts of instructional time than average. If this characteristic could be documented it would lead to the policy recommendation that amount of instructional time should be higher for children whose reading achievement is lower than would be expected based on age and intelligence.

Our next section will present some of the reading problems that are present for children in the intermediate grades four through six, as revealed in current research. A first issue that may be raised is whether children who are low achievers in reading at this age are proficient in decoding. One simple approach to this problem is to identify a group of ten-year-olds in fifth grade who are high and low achievers. Belmont and Birch (1966) identified such groups. The poor readers were 1.5 grade equivalents below the normal readers on the Metropolitan Achievement Test: reading, which requires comprehension. For these groups the performance on the word knowledge subtest was compared. This subtest requires matching a single word to several other single word alternatives. It demands decoding and semantic recognition of single words and is less complex than answering questions over paragraphs, as the reading subtest requires. The poor readers were 2.0 years in grade equivalent behind the good readers on the word knowledge subtest, indicating that they were about as far behind their peers in decoding and recognizing meanings of single words as they were in reading comprehension. It should be noted that these two subtests are norm-referenced separately. They are not based on the same psychometric scales and absolute comparisons should not be made.

Investigators have illustrated that decoding accuracy is not entirely accomplished by the intermediate grade levels. Among them, Guthrie (1973) compared normal fourth graders with low achievers in fourth grade who performed at about the second grade level on standardized reading comprehension measures. The poor comprehenders were noticeably lower in decoding eight categories of words and syllable units. In fact, the poor readers were virtually identical to a younger group of children reading at about the second grade level. In other words, the proficiency of decoding among children who are poor comprehenders in fourth grade is very similar to the decoding level of younger children who are matched with them on comprehension. Groups of children who are similar on reading comprehension often appear similar on a variety of decoding tasks.

Decoding is very closely related to the acquisition of orthographic rules. For example, as illustrated by Calfee, Venezky and Chapman (1969), when the letter *c* is followed by *e* or *i* it appears with the *s* sound, whereas when *c* is followed by *a*, *o* or *u*, it appears with the sound *k*. Synthetic words that are governed by these rules are pronounced more accurately by sixth graders than third graders. Both good and poor readers improve in the acquisition of this rule. However, poor readers are inferior to good readers at both third and sixth grade in their mastery of this rule. In other words, if acquisition of decoding is construed as the learning of orthographic rules it is apparent that poor readers are inferior to good readers in sixth grade. In addition, rule learning in these terms continues into eleventh and twelfth grade of high school. It seems that decoding proficiency increases throughout the intermediate grades and later. Decoding, or orthographic rule learning, is not acquired and mastered at an early stage and then followed by rapid acquisition of comprehension processes. Decoding accuracy continues to develop to the end of elementary school and beyond.

In addition to decoding inaccurately, poor readers at the intermediate level have often been observed by teachers to decode slowly. If slow decoding is widespread and frequent among poor readers, it may have inhibitive effects beyond those of trying the patience of teachers. There is cucrent speculation (Perfetti, 1976; LaBerge & Samuels, 1974) that slow decoding and inefficient verbal processing of sentences may be interconnected. If children have a limited capacity for cognitive processing and a substantial amount of their processing space is consumed by decoding, then the comprehension of sentences and discourse may be reduced. While these hypotheses have yet to be confirmed, rapid decoding is a potentially important cognitive operation.

Rapid decoding was found to be correlated with reading comprehension by Perfetti and Hogaboam (1975). That is, fifth graders who achieved poorly on a reading comprehension test were slower in pronouncing isolated words than fifth graders who performed normally in comprehension. A similar finding was reported by Mackworth and Mackworth (1974) who noted that reaction time in judging whether two words had the same sound, (e.g. bear-bare) was slower for poor readers than good readers at all grade levels from first through sixth. This outcome was substantiated by Steinheiser and Guthrie (1976), who illustrated that word matching based on sound which requires decoding, was slower for poor readers than good readers despite the fact that word matching based on visual features alone was similar for the two groups. Just as accuracy of decoding improves with age beyond elementary school, speed of decoding also improves. It has been found that the time required to recognize isolated target words presented tachistoscopically is twice as high for fourth graders as for adults (Samuels, Begy & Chen, 1976). This illustrates that speed of word recognition increases as reading fluency improves from fourth grade to adulthood.

An aspect of reading that is allied with decoding is the acquisition of orthographic structure. As outlined by Gibson and Levin (1975) and others, orthographic structure refers to intraword redundancy, rules for permissable letter sequences, and the preservation of meaning in the spelling patterns for words. The lexical similarity of two words, for instance, grace and gracious, is maintained in the phonological structure (pronunciation) and in the orthographic structure (spelling) of the two words. There is some modest evidence that intermediate-aged poor readers have not acquired orthographic structure as fully as good readers at this age level. Barganz (1974) found that fifth-grade children who were low achievers in reading were worse than good readers at the same grade level in using orthographic structure for word identification. In the study, children were presented two spoken sentences with the last word omitted. For example, "To discuss a topic is to talk about it. If a group of students talked about a topic it would be a ______________." Four visual alternatives were presented including 1) discushun 2) discussion 3) discushion 4) discuzion. Good readers were more facile than the poor readers in selecting the correct visual alternative, illustrating their utilization of morphophonemic mapping rules as described by Venezky (1967). Furthermore, Mason (1975) has found in a series of studies that good and poor readers at the sixth-grade level are distinguished on their ability to use spatial redundancy of letters and words. For example, she found that a letter is identified more rapidly in a word than in a nonword, because letters in words occur in redundant spatial locations. For example, the letter s is more easily identified in "seldom" or "somled" than the word "sdelmo" since the d and the o in the latter word occur in unusual or nonredundant locations. While this line of research is only beginning, it may represent a form of abstract rule learning that is a cognitive hurdle for low achievers in reading.

Inasmuch as the comprehension of spoken language requires semantic and syntactic processing, the comprehension of written material should also engage the reader in these cognitive operations. Confirming this assumption, there is recent evidence (Guthrie & Tyler, 1976) that the differences in the recall of meaningful, anomalous and random sentences occur in about equal amounts for both listening and reading situations, for both good and poor readers. This is significant since the difference between the recall of meaningful and anomalous sentences is thought to reflect semantic processing and the difference between the recall of anomalous and random sentences is thought to be an index of syntactic processing (McNeil, 1970).

While good and poor readers certainly obtain some benefit from syntactic and semantic properties of sentences, there is evidence that poor readers are nevertheless weaker in this regard. For example, Samuels, Begy and Chen (1976) illustrated that poor readers were inferior to good readers on filling in the spaces when presented with a stimulus of black c_ _ or deep sn_ _. This may be interpreted as indicating that poor readers were inferior in using the lexical cue "black" that was available to assist in the identification of the word cat. In another illustration of semantic processing in sentences, Steinheiser and Guthrie (1974) found that poor readers were weaker than good readers in locating target words of a semantic category within written paragraphs.

That poor readers may be inferior to good readers in processing syntactic features of sentences was suggested by Miller and Isakson (1976). Oral reading errors of good readers increased when syntactic violations were placed in sentences, but the oral reading errors of poor readers were not influenced by syntactic violations. Unfortunately, this study is weakened by the fact that oral reading errors of poor readers could be a consequence of poor decoding, whereas the oral reading errors of good readers could be a consequence of disruption of processing syntactic features. However, additional support for the general notion is provided by Weinstein and Rabinovitch (1971), who demonstrated that poor readers may not use the constraints of word order in sentences as efficiently as normals in learning an oral sentence repetition task. Poor readers do not seem to use syntactic characteristics of sentences, such as word order constraints and syntactic markers (ing, plural s) to facilitate processing. A problem with this study for our purposes is that it contained listening tasks but not reading tasks. The only observation that can be made with this limited evidence is that processing of semantic and syntactic properties of sentences during reading is a probable weakness for poor readers and merits further study.

Another level of processing that should be considered here is that of intersentence relations and inferences from discourse. Do good and poor readers differ on these categories of higher order operations? Consider intrasentence relations first. For children at the intermediate grade levels, it has been suggested that poor readers are worse than good readers in their ability to recall information from multi-clause sentences or recall information from a sentence in a paragraph that precedes the sentence the child is reading at any given moment (Perfetti & Goldman, 1976). While the findings are limited, this area of cognitive processing deserves closer examination as a potential distinction among good and poor readers.

At the most global level, one may ask whether good and poor readers are different in their comprehension of written discourse. As Sticht, Beck & Hauke (1974) have amply documented, reading comprehension of discourse among children at intermediate grade levels is lower than listening comprehension (auding). Efficiency of comprehension during reading is lower than efficiency of comprehension during auding. This discrepancy may be exaggerated for poor readers. Oaken, Wiener and Cromer (1971) illustrated that for good and poor readers who are similar on listening comprehension, poor readers performed worse on answering questions over written paragraphs than good readers. It should be noted that these differences in reading comprehension may be attributable to any of the cognitive processes listed previously in this section, or to a factor that is somehow specific to this higher order operation. The more complex the task being described, the more difficult it is to ascribe a cause of deficiency to any single source of processing.

When good and poor readers are administered a variety of straightforward reading tasks, they generally differ on all of them. These differences are illustrated in the National Assessment of Educational Progress Reading Summary (1972). While good and poor readers are not contrasted directly in this report, comparisons can be made. First, we compared overall reading level in different types of communities, including extreme inner-city and extreme affluent suburb. Of course, the former were lower in reading achievement. These types of communities were then compared on eight different reading subtests. We will use the extreme inner-city to represent lower achievers and the extreme affluent suburb to represent higher achievers. On this basis, high achievers were superior to low achievers in every subtest, including: single word meanings, written directions, reference materials, significant facts, main ideas, inferences, critical reading. Certainly, high and low achievers at the intermediate grade level differ on many aspects of reading. It is not the case that low achievers have acquired the apparently simpler aspects, such as single word meanings, and failed to learn the more complex aspects such as inferences and critical reading. Their retardation in reading is global and strategies of remediation must take this pervasive deficiency of processing into account.

From this review it is apparent that good and poor readers at the intermediate grade levels may be distinguished in terms of several levels of processing related to reading. Low achievers seem to be inferior to higher achievers on: decoding accuracy, decoding speed, extraction of orthographic structure, processing semantic and syntactic features, and forming intersentence relations and inferences from discourse. There is at least tentative evidence that none of these levels of processing should be discounted as a source of problems for poor readers at the intermediate grade levels. What we have here is a list of cognitive processes that seem to be important for reading, and seem to distinguish good from poor readers. To increase the reading achievement of this age group will probably require improvement of all of these processes. This may be accomplished by direct instruction on these different components in a distributed and integrated manner. It may also be accomplished by emphasizing the derivation of knowledge and pleasure from reading and causing children to read voraciously from materials at an appropriate level of instructional difficulty.

A comprehensive consideration of the instructional implications of this review will not be presented here. However, we suggest that goals and guidelines for educational activities in reading could be constructed partly from this foundation in cognitive processes.

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## Table 1

## Relative Magnitude of Factors Associated with Achievement

| Factors to be Equalized | % Reduction in Test Score Inequality |
|---|---|
| Genetic | 33-50 |
| Total Environment | 25-40 |
| Economic Status | ≤6 |
| Amount of Schooling | 5-15 |
| Quality of Elementary Schools | ≤3 |
| Quality of High Schools | ≤1 |
| Elimination of Segregation | 10-20 |
| School Resources/Expenditures | 0 |

(adapted from Jencks, 1972)

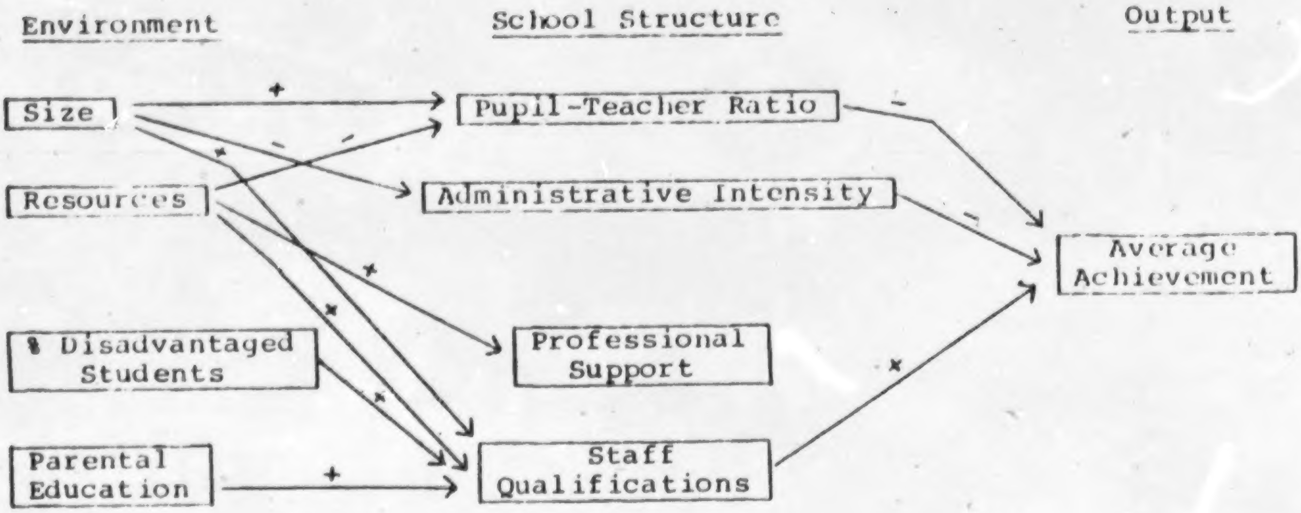
Table 2

Characteristics of Successful AIR Reading Programs

| | | COMMON COMPONENTS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Objectives and Planning | Teacher Training | Relevant Instruction | High Intensity in Instruction | Parent Involvement | Individualized Instruction | Resource Personnel and Reading Specialists | Continuous Feedback |
| PROGRAMS | IRIP | X | X | X | X | X | | X | |
| | Project Read | X | X | X | X | X | X | | X |
| | TITLE I Reading Center | X | X | X | X | X | X | X | X |
| | Learning to Read Through the Arts | X | X | X | X | X | X | X | |
| | Andover's Individualized Reading System | X | X | X | X | X | X | X | X |
| | Child Parent Center | X | X | X | X | X | X | | X |
| | All Day Kindergarten | X | X | X | X | X | X | | |

Figure 1

Model of school district system, adapted from Bidwell and Kasarda (1975).


Environment
School Structure
Output
Size
Resources
% Disadvantaged Students
Parental Education
Pupil-Teacher Ratio
Administrative Intensity
Professional Support
Staff Qualifications
Average Achievement
+
-
-
+
+
+
+
+
-
-
+

Note: Plus and minus signs indicate directionality of relationship between variables.

Figure 2

Model of amount of schooling and achievement, adapted from Wiley and Harnischfeger, 1974.

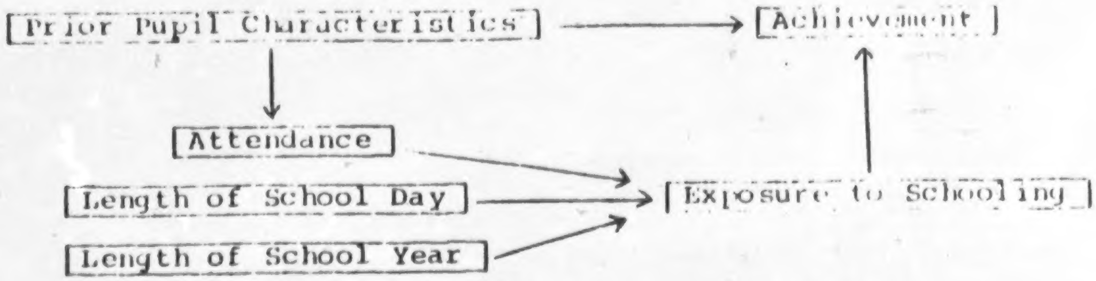
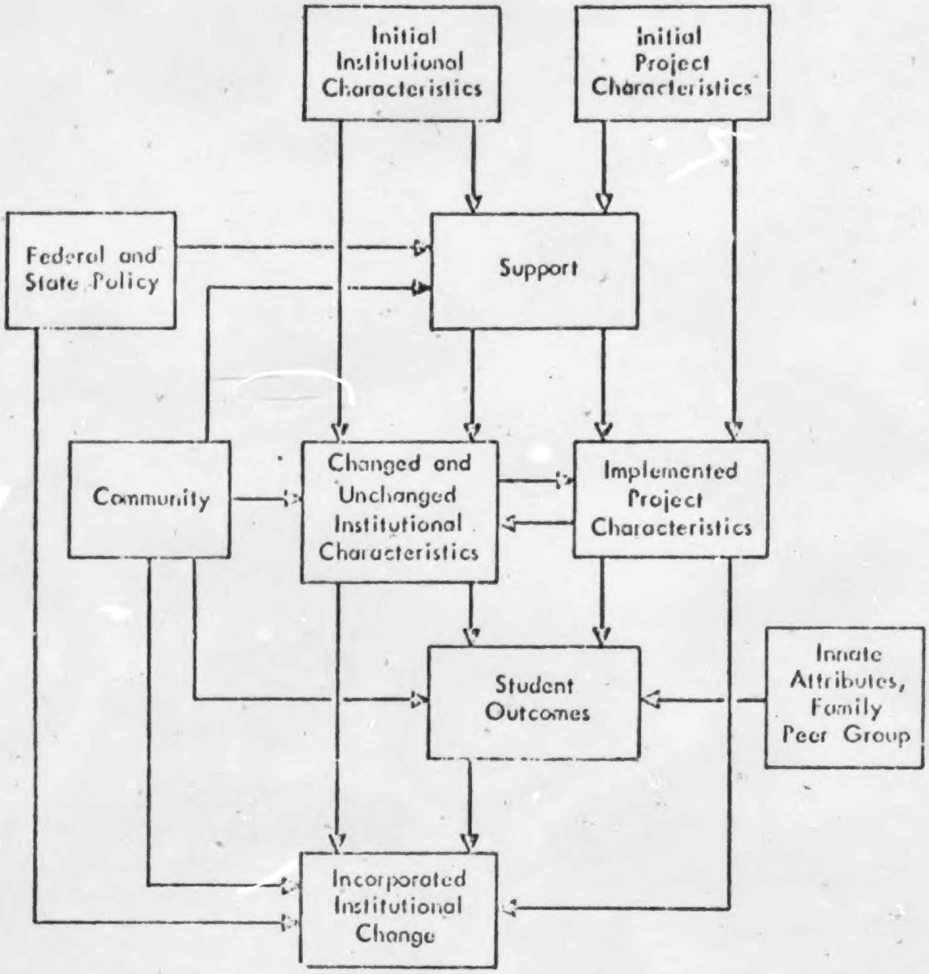

Prior Pupil Characteristics
Achievement
Attendance
Length of School Day
Length of School Year
Exposure to Schooling

Figure 3

A model of educational change

(Berman, et.al., Volume I, September, 1974, p. 19)



Initial Institutional Characteristics
Initial Project Characteristics
Federal and State Policy
Support
Community
Changed and Unchanged Institutional Characteristics
Implemented Project Characteristics
Student Outcomes
Innate Attributes, Family Peer Group
Incorporated Institutional Change